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THE TRANSACTIONS

OF THE

EDINBURGH OBSTETRICAL SOCIETY

THE TRANSACTIONS

OF THE

EDINBURGH OBSTETRICAL SOCIETY.

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PREFACE.

THIS, the twenty-sixth volume of the Society's Transactions, contains a record of its proceedings during the Session 1900–1901.

In it, as in former volumes, the views brought forward in the Papers are to be considered as those of the writers themselves and not as those of the Society as a body.

THE EDITOR.

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100	William Richardson, M.D., F.R.C.S. Ed., *Bristol*,	1884
	Fourness Barrington, M.B., F.R.C.S. Eng., *Sydney, Australia*,	1884
	*Francis William Nicol Haultain, M.D., F.R.C.P. Ed.,	1884
	*John Struthers Stewart, L.R.C.P. & S. Ed.,	1884
	Alexander Campbell, M.D., F.R.C.S. Ed., *Dundee*,	1885
105	Charles Batten Gracie, L.R.C.P. Ed., M.R.C.S. Eng., *Burntisland*,	1885
	Frederick Anastasius Saunders, F.R.C.S. Ed., L.R.C.P. Ed., *Grahamstown, South Africa*,	1885

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	John Smith, M.D., M.R.C.S. Eng., *Kirkcaldy*,	1885
	Allan Cuthbertson Sym, M.D., C.M.,	1885
	Frederick J. Underhill, F.R.C.S. Ed., L.R.C.P. Ed., *British Columbia*,	1885
110	William Gayton, M.D., M.R.C.P.L., M.R.C.S. Eng., *London*,	1885
	*Alexander Matthew, F.R.C.S. Ed., *Corstorphine*,	1885
	Alexander Somerville Cumming, M.D., F.R.C.P. Ed.,	1885
	Gustave Michael, M.B., C.M., *London*,	1885
	*James Haig Ferguson, M.D., F.R.C.P. Ed., M.R.C.S. Eng.,	1885
115	John Edward Gemmell, M.B., C.M., *Liverpool*,	1885
	Robert Stewart, M.B., C.M.,	1885
	Surgeon-Captain Robert Charles Macwatt, M.B., B.Sc., C.M., 7th Bengal Cavalry, *Bombay*,	1885
	*E. H. Lawrence Oliphant, M.D., C.M., *Glasgow*,	1885
	Andrew Wallace Walker, L.R.C.P. Ed., L.F.P. & S. Glasg.,	1886
120	James Hogarth Pringle, M.B., F.R.C.S. Eng., *Glasgow*,	1886
	Walter Blake Nisbet, M.B., C.M., *N. Queensland*,	1886
	Robert Swan Aitchison, M.D., F.R.C.P. Ed.,	1886
	John Walton Hamp, L.F.P. & S. Glasg., L.S.A., *Wolverhampton*,	1886
	John Dickinson Leigh, M.B., F.R.C.S. Ed., *Scarboro'*,	1886
125	James Auriol Armitage, M.D., C.M., *Wolverhampton*,	1886
	William Henry Miller, M.D., F.R.C.P. Ed.,	1886
	John M'Call, L.R.C.P. Ed.,	1886
	Thomas Wood, M.B., C.M.,	1886
	Hugh M'Callum, L.R.C.P. & S. Ed., *Kinloch-Rannoch*,	1887
130	Nutting Stuart Fraser, M.B., M.R.C.S. Eng., *St John's, Newfoundland*,	1887
	Augustus Alexander Matheson, M.D., F.R.C.P. Ed.,	1887
	Robert Mackenzie, M.D., C.M., *Nairn*,	1887
	Simon Linton, M.B., C.M., *Grangemouth*,	1887
	Thomas Jackson Thyne, M.B., F.R.C.P. Ed.,	1887
135	W. Burns Macdonald, M.B., C.M., *Dunbar*,	1887
	John St Clair Boyd, M.D., M.Ch., *Belfast*,	1887
	Briton Smallman Robson, M.B., C.M., *Newcastle-on-Tyne*,	1887
	Ernest T. Roberton, M.D., M.R.C.S. Eng., *New Zealand*,	1887
	*Samuel Sloan, M.D., F.F.P. & S. Glasg., *Glasgow*,	1887
140	James Wm. Fox, L.R.C.P. & S. Ed., *Southampton*,	1887
	John Frederick Sturrock, M.B., C.M., *Broughty-Ferry*,	1887
	Alexander Primrose, M.B., M.R.C.S. Eng., *Toronto, Canada*,	1887
	Arthur Perigal, M.D., M.R.C.S. Eng., *New Barnet, Herts*,	1887
	James Aitken Clark, M.B., C.M.,	1887
145	Edward Carmichael, M.D., F.R.C.P. Ed.,	1887
	Percival Humble Watson, M.R.C.S. Eng., L.R.C.P. Ed., *Newcastle-on-Tyne*,	1887
	Charles Clark Teacher, M.B., C.M.,	1887
	Robert Inch, M.B., C.M., *Gorebridge*,	1887
	Ellis Thomas Davies, M.D., M.R.C.S. Eng., *Liverpool*,	1887
150	John Orr, M.B., C.M., *Eccles, Lancashire*,	1887
	*George Owen Carr Mackness, M.D., C.M., *Broughty-Ferry*,	1887
	Francis Joseph Baildon, M.B., C.M., *Southport*,	1887
	Surgeon-Lt. Ralph H. Maddox, M.B., M.R.C.S. Eng., I.M.S., *Bengal*,	1887
	James Williamson Martin, M.D., F.R.C.P. Ed., *Dumfries*,	1887
155	James Andrew Blair, M.D., C.M., D.Sc., *Newcastle-on-Tyne*,	1887
	*John Thomson, M.D., F.R.C.P. Ed.,	1887
	Robert Kirk, M.D., F.R.C.S. Ed., *Bathgate*,	1887
	*William Fraser Wright, M.B., C.M., *Leith*,	1887
	Alexander Bruce, M.D., F.R.C.P. Ed.,	1887
160	Richard Joseph Tristan, L.R.C.P. & S. Ed., *Retford, Notts*,	1887
	Robert Henry Blaikie, M.D., F.R.C.S. Ed.,	1888
	James Hutcheson, M.D., F.R.C.S. Ed.,	1888
	A. A. Jervis Pereira, M.D., *Delagoa Bay*,	1888

		Date of Admission.
	Christopher Martin, M.B., F.R.C.S. Eng., *Birmingham*,	1888
165	John George Havelock, M.D., C.M., *Montrose*,	1888
	John Pirie, M.B., C.M.,	1888
	James Gibson Graham, M.B., C.M., *Glasgow*,	1888
	Robert Adams Brewis, M.D., C.M., *Dursley*,	1888
	John Allison, M.D., C.M., *Kettering, Northampton*,	1888
170	Archibald Cowan Guthrie, M.B., C.M.,	1888
	Samuel Beatty, M.B., C.M., *Pitlochry*,	1888
	Professor James Chalmers Cameron, M.D., *Montreal*,	1888
	Albert Edward Morison, M.B., F.R.C.S. Ed., M.R.C.S. Eng., *West Hartlepool*,	1888
	George H. Temple, M.B., C.M., *Weston-super-Mare*,	1888
175	Norman L. Boxill, M.B., C.M., *Barbados*,	1888
	John Hunter Helm, M.B., C.M., *Ratho*,	1888
	George Scott MacGregor, M.D., C.M., *Glasgow*,	1888
	William Sneddon, M.B., C.M., *Cupar-Fife*,	1888
	Thomas Watts Eden, M.B., C.M., *London*,	1888
180	William Fordyce, M.D., F.R.C.P. Ed.,	1888
	Charles E. Harvey, M.B., M.R.C.S. Eng., *Sav-la-Mar, Jamaica*,	1889
	Alexander Lang Murray, L.R.C.P. & S. Ed.,	1889
	*George Pirrie Boddie, M.B., C.M.,	1889
	James F. W. Ross, M.D., *Toronto, Canada*,	1889
185	J. Stuart Nairne, F.R.C.S. Ed., F.F.P. & S. Glasg., *Glasgow*,	1889
	James S. Fox, M.B., M.R.C.S. Eng., *St Helens*,	1889
	S. M'Murtry, M.D., *Louisville, Kentucky, U.S.A.*,	1889
	Hugh Jamieson, M.D., C.M.,	1889
	Thomas Wm. Nassau Greene, L.R.C.P. Ed., L.R.C.S.I., *Carlow*,	1889
190	Professor John Clarence Webster, M.D., F.R.C.P. Ed., *Chicago*,	1889
	William George Aitchison Robertson, M.D., F.R.C.P. Ed.,	1889
	William Basil Orr, M.D., C.M.,	1889
	*Edward Farr Armour, M.B., C.M.,	1889
	George Wilkinson, M.D., C.M., *Liverpool*,	1889
195	*James Lamond Lackie, M.D., F.R.C.P. Ed.,	1889
	James Wilson, M.B., C.M.,	1889
	Archibald Maclean, M.D., C.M., *Kilmarnock*,	1890
	Frederick William Lyle, M.D., C.M., *London*,	1890
	Thomas Dobson Poole, M.D., C.M., *St Anne's-on-the-Sea*,	1890
200	Walter Scott Gibson, M.B., C.M., *London*,	1890
	Charles Newberry Cobbett, M.D., C.M., *London*,	1890
	Alexander William Gordon Price, M.B., C.M.,	1890
	Hugh Shapter Robinson, M.R.C.S. Eng., L.R.C.P. Ed., *London*,	1890
	George Matheson Cullen, M.D., C.M.,	1890
205	Frederick Albert L. Lockhart, M.B., C.M., *Montreal, Canada*,	1890
	Edmund Frederick Tanney Price, M.B., C.M.,	1890
	Ernest Theophilus Roberts, M.D., C.M., *Keighley*,	1890
	Owen Foulkes Evans, M.D., C.M., *Liverpool*,	1890
	James Duncan Farquharson, M.B., C.M., *Newcastle-on-Tyne*,	1890
210	William Smith, L.R.C.P. & S. Ed.,	1890
	Harvey Littlejohn, M.B., F.R.C.S. Ed.,	1890
	Robert Wise, M.D., C.M., *London*,	1890
	William Russell, M.D., F.R.C.P. Ed.,	1890
	Alexander Scott Duncan, M.B., C.M., *London*,	1890
215	Prof. William Keiller, F.R.C.S. Ed., *Galveston, Texas, U.S.A.*,	1890
	Michael Dewar, M.D., C.M.,	1891
	Gains T. Smith, M.D., *Moncton, New Brunswick*,	1891
	John Hugh Alexander Laing, M.B., C.M.,	1891
	Robert Thin, M.B., F.R.C.P. Ed.,	1891
220	Alexander H. Vassie, M.B., C.M., *London*,	1891
	James Harvey, M.D., C.M.,	1891

		Date of Admission.
	Alexander Henderson, M.B., C.M.,	1891
	James Smith, M.B., C.M.,	1891
	George Balfour Marshall, M.D., C.M., *Glasgow*,	1891
225	William Booth, F.R.C.S. Ed.,	1891
	Richard T. Yoe, M.D., *Louisville, Kentucky, U.S.A.*,	1891
	Alexander Bruce Giles, M.D., C.M.,	1891
	Hamilton Graham Langwill, M.D., F.R.C.P. Ed., *Leith*,	1891
	Herbert Ernest Lee, M.B., C.M., *Australia*,	1891
230	Charles Martin, M.B., C.M., *Newton Abbot*,	1892
	William Murray Cairns, M.B., C.M., *Liverpool*,	1892
	Robert Dundas Helm, M.D., C.M., *Carlisle*,	1892
	William Wood, M.B., C.M.,	1892
	James Thomas Moore Giffen, F.R.C.S. Ed., *Chester*,	1892
235	John Alexander Robertson, M.B., C.M., *Cape Colony*,	1892
	Frank Dendle, M.B., C.M., *Dunfermline*,	1892
	Julius Henry Beilby, M.B., C.M., *Bromsgrove*,	1892
	Frederick Thomas Anderson, M.D., F.R.C.S. Ed., *Braunton*,	1892
	J. Gordon Smith, L.R.C.P. & S. Ed., *West Africa*,	1892
240	Simson Carstairs Fowler, M.B., C.M., *Juniper Green*,	1892
	Hugh Ernest Fraser, M.D., C.M., *Dundee*,	1892
	Prof. John Alexander Campbell Kynoch, M.B., F.R.C.P. Ed. *Dundee*,	1892
	Alexander Brown Ritchie, M.B., C.M., *Hulme, Manchester*,	1892
	Walter John Shaw, M.B., C.M., *Cockburnspath*,	1892
245	Stirling, M.D., C.M., *Perth*,	1892
	William Henry Vickery, F.R.C.S. Eng., L.R.C.P. Lond., *Newcastle-on-Tyne*,	1892
	William Ramsay Smith, M.B., C.M., *Australia*,	1892
	A. Watson Munro, M.D., *Sydney, Australia*,	1892
	Charles Frederick Ponder, M.B., C.M., *Glasgow*,	1892
250	John Tod, M.B., C.M., *Leith*,	1892
	Richard J. Erskine Young, M.D., C.M.,	1892
	George Thomas C. Adams, L.R.C.P. & S. Ed., *Melbourne, Aust.*,	1892
	George Henry Walter Smith, M.D., C.M., *Sydney, Australia*,	1892
	John Lawson Dick, M.B., C.M., *Cape Colony*,	1892
255	Charles Croomhall Easterbrook, M.D., C.M.,	1892
	Walter Petrie Simpson, M.B., C.M., *Coningsby*,	1892
	James Ernest Moorhouse, M.D., C.M., *Stirling*,	1892
	D. W. Johnston, F.R.C.S. Ed., *Johannesburg, South Africa*,	1892
	David George Davidson, M.B., C.M.,	1892
260	Allen Thomson Sloan, M.D., C.M.,	1893
	Robert Balfour Graham, F.R.C.S. Ed., *Leven, Fife*,	1893
	Albert Frederick Ross, M.B., C.M.,	1893
	George Benjamin Mitchell, M.B., C.M., *Whitby*,	1893
	H. Robins, M.D., *Jamaica*,	1893
265	Linn J. Schofield, M.D., *Warrensbury, Mo., U.S.A.*,	1893
	David Milligan, M.B., C.M.,	1893
	George Morton Wilcockson, L.R.C.P. & S. Ed., *Reading*,	1893
	John MacRae, M.D., C.M., *Murrayfield*,	1893
	Ernest Switzer Forde, L.R.C.P. & S. Ed., *Dalry, Galloway*,	1893
270	George Wade, M.D., C.M., *Melrose*,	1893
	Philip Grierson Borrowman, M.B., C.M., *Crieff*,	1893
	John Liddell, M.D., C.M., *Harrogate*,	1893
	William Herbert Gregory, M.D., C.M., *Beverley, Yorks*	1893
	James Gibson Cattanach, M.B., F.R.C.P. Ed.,	1893
275	Alexander Maitland Easterbrook, M.B., C.M., *Gorebridge*,	1893
	Robert William Roberts, L.R.C.P. & S. Ed., *South Wales*,	1894
	Claude Buchanan Ker, M.D., C.M.,	1894
	John Malcolm Farquharson, M.B., C.M.,	1894
	Charles Alexander Butchart, M.B., C.M.,	1894
280	Frederick Maurice Graham, F.R.C.S. Ed., L.R.C.P. Ed.,	1894
	Robert Hoggan, M.B., C.M., *Liberton*,	1894

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	James Livingstone Thompson, M.B., C.M., *Australia*,	1894
	George Stevenson Shirt Hirst, M.B., C.M., *Withern*,	1894
	John Stevens, M.D., F.R.C.P. Ed.,	1894
285	Hugh Lewis Hughes, L.R.C.P. & S. Ed., *Dowlais*,	1894
	Sylvanus Glanville Morris, M.D., C.M., *Nantgaredig*,	1894
	Georges P. Coromilas, M.D., *Athens, Greece*,	1894
	Thomas Easton, M.D., C.M., *Southampton*,	1894
	David Robertson Dobie, M.D., C.M., *Crieff*,	1894
290	Gopal Govind Vatve, M.D., *Bombay*,	1894
	Robert William Beesley, M.D., C.M., *Bolton*,	1894
	William A. Stephen, M.D., C.M., *Loftus-in-Cleveland*,	1894
	William Edward Fothergill, M.D., C.M., *Manchester*,	1894
	George Sandison Brock, M.D., C.M., *Rome*,	1894
295	John M. Munro Kerr, M.B., C.M., *Glasgow*,	1894
	John Montgomery, M.B., C.M., *Birmingham*,	1895
	Robert Cochrane Buist, M.D., C.M., *Dundee*,	1895
	Robert Thomson Ferguson, M.B., C.M., *Anstruther*,	1895
	William Henry Stephenson, L.R.C.P.& S.Ed., L.F.P.& S.Glasg., *Manchester*,	1895
300	Angus Vallance MacGregor, M.D., C.M., *Hartlepool*,	1895
	Charles William Donald, M.B., F.R.C.S. Ed.,	1895
	Oguntola Sapara, L.R.C.P. & S. Ed., *Lagos, W. Africa*,	1895
	John Struthers, M.B., C.M., *Transkei, South Africa*,	1895
	B. W. Broad, M.B., C.M., *Cardiff*,	1895
305	Edwin Hindmarsh, M.B., C.M., *Bengal*,	1895
	Patrick Mackin, L.R.C.P. & S. Ed., *New Zealand*,	1895
	G. Edgar Helme, M.B., C.M., *Manchester*,	1895
	Percy Theodore Hughes, M.B., C.M., *Bexley*,	1895
	John Hosack Fraser, M.B., F.R.C.P. Ed., *Bridge of Allan*,	1895
310	Stewart Grant Ogilvy, M.B., C.M., *Addiewell*,	1895
	Thomas Howard Morgan, M.D., F.R.C.S. Ed., *Queensland, Aust.*,	1895
	William Macrae Taylor, M.B., F.R.C.S. Ed.,	1895
	David James Graham, M.D., C.M.,	1895
	Walter William Chipman, M.D., F.R.C.S. Ed., *Montreal*,	1895
315	John Cumming, F.R.C.S. Ed., L.R.C.P. & S. Ed.,	1896
	Sol Jervois Aarons, M.D., C.M., *London*,	1896
	Robert Beveridge, M.B., C.M., *Leith*,	1896
	John Anderson, M.B., C.M., *Pitlochry*,	1896
	Thomas John Burton, M.D., C.M., *Bearsden*,	1896
320	Robert M. Leith, M.B., C.M., *Port Elizabeth, Cape Colony*,	1896
	Robert Gordon M'Kerron, M.B., C.M., *Aberdeen*,	1896
	Frederick John M'Cann, M.D., M.R.C.P.L., *London*,	1896
	David Robert Taylor, L.R.C.P. & S.Ed., *Ayton*,	1896
	James Curtis Whyte, M.D., C.M., *Dalkeith*,	1896
325	George William Simla Paterson, M.B., C.M.,	1896
	William Robert Martine, M.B., C.M., *Haddington*,	1896
	Robert Henry Watson, M.D., C.M., *Hamilton*,	1896
	Thomas Marshall Callender, M.D., C.M., *Sidcup*,	1896
	Lewis Grant, M.B., C.M., *Neston*,	1896
330	Robert Robertson, M.B., C.M.,	1897
	James Wilkie, L.R.C.P. & S. Ed., *Portobello*,	1897
	Andrew Graham, M.D., *Currie*,	1897
	Douglas Chalmers Watson, M.B., F.R.C.P. Ed.,	1897
	Robert Mair, M.D., C.M., *Hawick*,	1897
335	Roderick Murdoch Matheson, M.D., C.M., *Isle of Man*,	1897
	Robert Jardine, M.D., F.F.P.S.Glasg., M.R.C.S. Eng., *Glasgow*,	1897
	Daniel Charles Edington, M.D., C.M., *Penrith*,	1897
	Edwin Arthur Gibson, M.B., C.M., *Glasgow*,	1897
	John Macmillan, M.D., F.R.C.P. Ed.,	1897
340	Harold Sherman Ballantyne, M.B., C.M., *Dalkeith*,	1897
	Ernest Edward Porrit, M.B., F.R.C.S. Ed., *New Zealand*,	1897
	William John Garbutt, M.B., C.M., *Birmingham*,	1897

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	Henry John Forbes Simson, M.B., F.R.C.S. Ed.,	1897
	William Herbert Goldie, M.D., C.M., *Auckland, New Zealand*,	1897
345	Charles Minor Cooper, M.B., Ch.B.,	1897
	William Alexander Potts, M.D., C.M., *Birmingham*.	1897
	Angus Macdonald, M.B., C.M.,	1897
	Bernard Samuel Story, M.D., F.R.C.S. Ed., *Annfield Plain*,	1898
	Alexander Macdonald, M.B., F.R.C.S. Ed.,	1898
350	George Robert Livingston, M.B., C.M., *Dumfries*,	1898
	Charles Carmichael Forrester, M.B., C.M.,	1898
	William Morrison Milne, M.B, C.M.,	1898
	Percival George Bannister, M.D., C.M.,	1898
	William Joseph Murphy Barry, M.D., M.R.C.P. Ed., *Dublin*,	1898
355	Harold Malcolmson, M.B., C.M., *Burma*,	1898
	John Christie Forbes, L.R.C.P. & S. Ed., *Liberton*,	1898
	Alexander Cruikshank Ainslie, M.D., C.M.,	1898
	Henry Aylmer Dumat, M.D., C.M., *Durban, South Africa*,	1898
	Gabriel Maurange, M.D., *Paris*,	1898
360	John Thomas Woodside, L.R.C.P. & S. Ed., *Holywood*,	1898
	George Freeland Barbour Simpson, M.B., Ch.B.,	1898
	Alfred Charles Sandstein, M.D., Ch.B., *Isle of Skye*,	1898
	Alfred Shearer, M.B., Ch.B.,	1898
	John Henry Rhodes, M.B., Ch.B., *Kendal*,	1898
365	James Duncan Slight, M.D., Ch.B., *Portobello*,	1898
	Francis John Harvey Bateman, M.B., C.M., *Norwich*,	1898
	Robert John Johnston, M.B., C.M.,	1899
	George Lyall Chiene, M.B., F.R.C.S. Ed.,	1899
	Percy Theodore Herring, M.D., C.M.,	1899
370	William Bertie Mackay, M.D., *Berwick-on-Tweed*,	1899
	James Kennedy Drysdale, M.B., C.M.,	1899
	Carel Hendrick Krüger, M.D., F.R.C.S. Ed., *Cape Colony*,	1899
	Captain Patrick Wilkins O'Gorman, M.D., D.P.H., *India*,	1899
	Edward William Scott Carmichael, M.D., F.R.C.S. Ed..	1899
375	James Wilson M'Brearty, F.R.C.S. Ed., L.R.C.P. Ed., *New Zealand*,	1899
	John D. Cameron, M.D., *Montreal*,	1899
	George Crewdson Thomas, M.D., C.M., *Bath*,	1899
	John Eason, M.B., M.R.C.P. Ed., *Leith*,	1899
	William John Barclay, M.B., Ch.B.,	1899
380	Frederick Adolphus Fleming Barnardo, M.B., Ch.B., *Surbiton*,	1899
	Alexander Dingwell Fordyce, M.B., Ch.B.,	1899
	William Thomas Ritchie, M.D., C.M.,	1899
	Owen, St John Moses, M.D., C.M., B.Sc., *London*,	1900
	Charles Wakeham Holmested, L.R.C.P. & S. Ed., L.F.P.S. Glasg., *Tuxford*,	1900
385	Donald Macgregor, M.D., C.M., *Jedburgh*.	1900
	Harry Oliphant Nicholson, M.B., C.M.,	1900
	Thomas Scott Brodie, M.B., C.M., *Haywood*,	1900
	William Hope Fowler, M.B., Ch.B.,	1900
	John Stanley Manford, M.B., B.S., *Newcastle-on-Tyne*,	1900
390	Ogden Watson Ogden, M.D., M.R.C.S., *Newcastle-on-Tyne*,	1900
	John Craig, M.B., Ch.B.,	1900
	William Hartley Bunting, M.D., F.R.C.S. Ed.,	1900
	Theodore Charles Mackenzie, M.B., Ch.B., *Culrain*,	1900
	Donald George Hall, M.B., M.R.C.S. Eng., *Gatehouse-of-Fleet*,	1900
395	Hugh Corbett Taylor Young, M.D., C.M., *Sydney*,	1900
	John Boyd Jamieson, M.B., F.R.C.S. Ed.	1900
	William Alfred Johnstone Alexander, M.B., C.M.,	1900
	Malcolm M'Larty, M.B., C.M.,	1900
	Peter Joseph Henry Ferguson, M.B., C.M.,	1900
400	Frederick Gardiner, M.B., C.M..	1900
	George Mackie, M.B., Ch.B., *Montrose*,	1900
	Kenmure Melville, M.B., Ch.B.,	1900

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	John Thomas Dickie, L.R.C.P. & S. Ed.,	1900
	William Ernest Frost, M.B., Ch.B.,	1900
405	Frederick David Simpson, M.B., Ch.B.,	1900
	Francis Wilfrid Harlin, L.R.C.P. & S. Ed., *Leith*,	1900
	William Darling, M.B., Ch.B.,	1900
	Robert Macfarlane Mitchell, M.B., Ch.B.,	1900
	Malcolm Campbell, M.B., Ch.B.,	1900
410	James Ramsay Munro, M.B., Ch.B., *Bolton*,	1901
	George James Rogerson Carruthers, M.B., Ch.B.,	1901
	Jessie Maclaren MacGregor, M.D., C.M.,	1901
	Hilda Maud M'Farlane, L.R.C.P. & S. Ed.,	1901
	George Dickson, M.D., C.M.,	1901
415	Elsie Maud Inglis, M.B., C.M.,	1901
	George Robertson, L.R.C.P. & S. Ed., *Dunfermline*,	1901
	John Jeffrey, M.B., Ch.B., *Jedburgh*,	1901
	John Wishart Kerr, M.B., Ch.B.,	1901
	William Harold Graham Aspland, M.D., M.R.C.S. Eng., *Newfoundland*,	1901
420	William Taylor McArthur, M.D., F.R.C.S. Ed., *California*	1901
	William Hodgson Boazman, M.B., C.M.,	1901
	Alexander Waddel Greenhorn Clark, M.B., C.M.,	1901
	James Martin Reid, M.B., Ch.B.,	1901
	Henry Overton Hobson, M.B., C.M., *London*,	1901
425	Robert Patton Ranken Lyle, M.D., Ch.B., *Newcastle-on-Tyne*,	1901
	Alexander Girvan, M.D., F.R.C.S. Ed., *Maybole*,	1901
	Fred. W K Tough, L.R.C.P. & S. Ed., *Leith*,	1901

ORDINARY FELLOWS.

ARRANGED ALPHABETICALLY.

(*a.*) LIFE MEMBERS.

	Anderson, Dr John, Pitlochry,	1896
	Barbour, Dr A. H. Freeland, 4 Charlotte Square,	1879
	Craig, Dr John, 71 Bruntsfield Place,	1900
	Craig, Dr William, 71 Bruntsfield Place,	1870
5	Croom, Dr J. Halliday, 25 Charlotte Square,	1870
	Cumming, Dr John, 20 Gilmore Place,	1896
	Dumat, Dr Henry Aylmer, 7 Devonshire Place, Durban, Natal, South Africa,	1898
	Hart, Dr D. Berry, 29 Charlotte Square,	1877
	Johnston, Dr D. W., P.O. Box 2022, Johannesburg, Transvaal,	1892
10	Livingston, Dr George R., 35 George Street, Dumfries,	1898
	M'Farlane, Dr Hilda M., Glenbourne, Oswald Road,	1901
	Martin, Dr Christopher, Cleveland House, George Road, Edgbaston, Birmingham,	1888
	Morgan, Dr T. H., Gympie, Queensland, Australia,	1895
	Ponder, Dr Charles F., 5 Ailsie Drive, Langside, Glasgow,	1892
15	Ranking, Dr J. E., Tunbridge Wells,	1881
	Ross, Dr James F. W., 481 Sherbourne Street, Toronto, Canada,	1889
	Simpson, Professor A. R., 52 Queen Street,	1858
	Simpson, Dr G. F. Barbour, 50 Melville Street,	1898
	Struthers, Dr John, Nqamakwe, Transkei, South Africa,	1895
20	Vatve, Dr Gopal Govind, care of H.H. The Rajah of Miraj, Bombay, India,	1894

(*b.*) ANNUAL SUBSCRIBERS.

		Date of Admission.
	Aarons, Dr S. J., 14 Stratford Place, London, W.,	1896
	Adam, Dr George Rothwell, Carlton House, Hotham Street, East Melbourne, Australia,	1879
	Adams, Dr George T. Cooke, 58 Collins Street, Melbourne, Victoria, Australia,	1892
	Affleck, Dr J. O., 38 Heriot Row,	1869
25	Ainslie, Dr A. C., 20 Newington Road,	1898
	Aitchison, Dr R. S., 74 Great King Street,	1886
	Alexander, Dr W. A. Johnstone, 1 George Place,	1900
	Alexander, Dr W. B., 8 Blenheim Place,	1882
	Allison, Dr J., Fuller House, Kettering, Northampton,	1888
30	Anderson, Dr Fred. T., Braunton, N. Devon,	1892
	Andrew, Dr James, 2 Atholl Crescent,	1868
	Archibald, Dr J., Hazelden, Wimborne Road, Bournemouth,	1877
	Armitage. Dr J. A., 28 Waterloo Road South, Wolverhampton.	1886
	Armour, Dr E. F., 149 Bruntsfield Place,	1889
35	Aspland, Dr W. H. Graham, St John's, Newfoundland,	1901
	Badger, Dr W., Penicuik,	1880
	Baildon, Dr F. J., 42 Hoghton Street, Southport,	1887
	Balfour, Dr Andrew, 23 Abercorn Terrace, Portobello,	1877
	Ballantyne, Dr A., Dalkeith,	1870
40	Ballantyne, Dr H. S., Dalkeith,	1897
	Ballantyne, Dr J. W., 24 Melville Street,	1883
	Bannister, Dr P. G.,	1898
	Barclay, Dr W. J., Australasian Club, Melbourne Place,	1899
	Barnardo, Dr F. A. F., St Leonards Lodge, Surbiton,	1899
45	Barrington, Dr Fourness, 213 Macquarrie Street, Sydney, Australia,	1884
	Barry, Dr W. J. M., 105 Lower Baggott Street, Dublin,	1898
	Bateman, Dr F. J. Harvey, Upper St Giles Street, Norwich,	1898
	Beatty, Dr Samuel, Craigvar, Pitlochry,	1888
	Beesley, Dr R. W., 135 Deane Road, Bolton,	1894
50	Beilby, Dr Julius H., 39 High Street, Bromsgrove,	1892
	Bell, Dr J. Lumsden, Driffield, Yorkshire,	1884
	Bell, Dr Robert, 29 Lynedoch Street, Glasgow, W.,	1878
	Bentley, Dr G. H., Kirkliston,	1877
	Beveridge, Dr Robert, 9 James Place, Leith,	1896
55	Black, Dr Alexander, 13 Howe Street,	1881
	Black, Dr J. Watt, 15 Clarges Street, Piccadilly, London, W.,	1863
	Blaikie, Dr R. H., 42 Minto Street,	1888
	Blair, Dr J. A., 16 Windsor Terrace, Newcastle-on-Tyne,	1887
	Bleloch, Dr A., 2 Lonsdale Terrace,	1876
60	Boazman, Dr W. H., Victoria Cottage, Parkes, New South Wales.	1901
	Boddie, Dr G. P., 73 Bruntsfield Place,	1889
	Booth, Dr William, 2 Minto Street,	1891
	Borrowman, Dr Philip G., Viewfield, Crieff,	1893
	Boxill, Dr N. L., Buttalls, St George, Barbados,	1888
65	Boyd, Dr J. St Clair, 27 Victoria Place, Belfast,	1887
	Brewis, Dr N. T., 23 Rutland Street,	1883
	Brewis, Dr R. Adams, Reine Barnes, Dursley, Gloucestershire,	1888
	Broad, Dr B. W., The Sanitorium, Cardiff,	1895
	Brock. Dr G. Sandison, Via Veneto, B. Rome,	1894
70	Brodie, Dr T. Scott, Haywood, Lanarkshire,	1900
	Brodie, Dr W. Haig, Battle, Sussex,	1881
	Bruce, Dr Alexander, 8 Ainslie Place	1887
	Buist, Dr J. W., 1 Clifton Terrace,	1877
	Buist, Dr R. C., 166 Nethergate, Dundee,	1895
75	Bunting, Dr W. Hartley, 74 Bruntsfield Place,	1900
	Burton, Dr Thomas J., Lonsdale, Bearsden, Glasgow,	1896
	Butchart, Dr C. A., 52 Leith Walk, Leith,	1894

		Date of Admission.
	Cairns, Dr W. Murray, 67 Catherine Street, Liverpool,	1892
	Calder, Dr H. L., 60 Leith Walk, Leith,	1882
80	Callender, Dr T. M., Wylverley, Sidcup,	1896
	Cameron, Prof. James C., M.D., 941 Dorchester St., Montreal,	1888
	Cameron, Dr John D., 2068 St Catherine Street, Montreal, Canada,	1899
	Campbell, Dr Alexander, 1 Clarendon Terrace, Dundee,	1885
	Campbell, Dr Malcolm, 3 Morton Terrace,	1900
85	Carmichael, Dr Edward, 21 Abercromby Place,	1887
	Carmichael, Dr E. W. Scott, 6 Castle Terrace,	1899
	Carmichael, Dr James, 22 Northumberland Street,	1871
	Carruthers, Dr G. J. R., 4 Melville Street,	1901
	Cattanach, Dr J. G., 3 Alvanley Terrace,	1893
90	Chiene, Dr George L., 26 Charlotte Square,	1899
	Chipman, Dr W. W., Royal Victoria Hospital, Montreal, Canada,	1895
	Church, Dr H. M., 36 George Square,	1875
	Clark, Dr A. W. G., 28 Braid Crescent,	1901
	Clark, Dr J. A., 4 Cambridge Street,	1887
95	Cobbett, Dr C. N., 29 Rosslyn Hill, Hampstead, London, N.W.,	1890
	Cooper, Dr C. M.,	1897
	Coromilas, Dr Georges P., 67 Minerva Street, Athens, Greece,	1894
	Cox, Dr Joshua J., Cromwell Chambers, 38 Deansgate, Manchester,	1876
	Croudace, Dr J. H., Foregate House, Stafford,	1878
100	Cullen, Dr G. M., 48 Lauriston Place,	1890
	Cumming, Dr A. S., 18 Ainslie Place,	1885
	Currie, Dr A. S., 81 Queen's Road, Finsbury Park, London, N.,	1882
	Darling, Dr T. Brown, 13 Merchiston Place,	1884
	Darling, Dr William, 12 Antigua Street,	1900
105	Davidson, Dr D. G., 9 Granville Terrace,	1892
	Davies, Dr E. T., 97 Shaw Street, Liverpool,	1887
	Dendle, Dr Frank, 2 Chalmers Street, Dunfermline,	1892
	Deverell, Dr H. C., 12 Windsor Street,	1882
	Dewar, Dr M., 24 Lauriston Place,	1891
110	Dick, Dr J. L. Cradoch, Cape Colony, South Africa,	1892
	Dickie, Dr J. T., 37 Lauriston Place,	1900
	Dickson, Dr George, 9 India Street,	1867
	Dickson, Dr George, 14 Ardmillan Terrace,	1901
	Dobie, Dr D. Robertson, Heathcote Road, Crieff,	1894
115	Donald, Dr C. W., 11 Braid Road,	1895
	Drysdale, Dr James K., 22 Coltbridge Terrace,	1899
	Duncan, Dr A. J., 158 Nethergate, Dundee,	1879
	Duncan, Dr A. S., 9 Newlands Park, Sydenham, London, S.E.,	1890
	Dunlop, Dr H. M., 20 Abercromby Place,	1884
120	Dunsmure, Dr J., 53 Queen Street,	1876
	Eason, Dr John, 196 Newhaven Road, Leith,	1899
	Easterbrook, Dr A. M., Gorebridge,	1893
	Easterbrook, Dr C. C., Craig House, Morningside,	1892
	Easton, Dr Thomas, 28 Park Terrace, Southampton,	1894
125	Eden, Dr T. Watts, 26 Queen Anne Street, Cavendish Square, London, W.,	1888
	Edington, Dr D. C., 4 Portland Place, Penrith,	1897
	Elder, Dr W. Nicol, 6 Torphichen Street,	1879
	Evans, Dr O. F., 71 Mulgrave Street, Liverpool,	1890
	Farquharson, Dr J. D., 242 Westgate Road, Newcastle-on-Tyne,	1890
130	Farquharson, Dr J. M., 2 Coates Place,	1894
	Felkin, Dr R. W., 48 Westbourne Gardens, Bayswater, London, W.,	1884
	Ferguson, Dr J. Haig, 25 Rutland Street,	1885
	Ferguson, Dr P. J. H., 162 Montgomery Street,	1900

		Date of Admission
	Ferguson, Dr R. T., Anstruther, Fife,	1895
135	Finlay, Dr W. A., 50 Trinity Road,	1880
	Forbes, Dr J. C., Ardveich, Liberton,	1898
	Forde, Dr E. S., Dalry, Galloway,	1893
	Fordyce, Dr A. Dingwall, 34 Great King Street,	1899
	Fordyce, Dr William, 20 Charlotte Square,	1888
140	Fothergill, Dr W. E., 200 Oxford Road, Manchester,	1894
	Forrester, Dr C. C., 12 Greenhill Place,	1898
	Fowler, Dr Simson C., Juniper Green,	1892
	Fowler, Dr W. Hope, 5 St Vincent Street,	1900
	Fox, Dr James S., 6 Baldwin Street, St Helen's,	1889
145	Fox, Dr J. W., 66 Lodge Road, The Avenue, Southampton,	1887
	Fraser, Dr H. E., Royal Infirmary, Dundee,	1892
	Fraser, Dr J. Hossack, Fernfield, Bridge of Allan,	1895
	Fraser, Dr J. Joynor, Hessle, East Yorks,	1880
	Fraser, Dr Nutting S., 205 Gower Street, St John's, Newfoundland,	1887
150	Frost, Dr W. E., 120 Gilmore Place,	1900
	Garbutt, Dr W. J., Fairview, Selly Oak, near Birmingham,	1897
	Gardiner, Dr Frederick, 40 Rankeillor Street,	1900
	Gayton, Dr William, Bartram Lodge, Fleet Road, Hampstead, London, N.W.,	1885
	Gemmell, Dr J. E., 12 Rodney Street, Liverpool,	1885
155	Gibson, Dr E. Arthur, 2 Queen's Crescent, Glasgow, W.,	1897
	Gibson, Dr W. Scott, 34 Dulwich Road, Herne Hill, London, S.E.,	1890
	Giffen, Dr J. T. M., 142 Boughton, Chester,	1892
	Giles, Dr A. B., 4 Palmerston Place,	1891
	Gilmour, Dr T. F., Port Ellen, Islay,	1882
160	Girvan, Dr Alexander, Whitehall House, Maybole,	1901
	Goldie, Dr W. H., Auckland, New Zealand,	1897
	Gracie, Dr C. B., Buccleuch Villa, Burntisland,	1885
	Graham, Dr A., Curriebank, Currie,	1897
	Graham, Dr D. J., 28 Gilmore Place,	1895
165	Graham, Dr F. M., 16 Mayfield Gardens,	1894
	Graham, Dr J. Gibson, 17 Ashton Ter., Dowanhill, Glasgow,	1888
	Graham, Dr R. Balfour, Leven, Fife,	1893
	Grant, Dr Lewis, Rock House, Neston, Cheshire,	1896
	Greene, Dr T. W. N., Bella Vista, Kew Gardens, Carlow, Ireland,	1889
170	Gregory, Dr W. H., 2 Bar Houses, Beverley, Yorks,	1893
	Guthrie, Dr A. Cowan, 171 Constitution Street, Leith,	1888
	Hall, Dr D. G., Woodlyn, Gatehouse-of-Fleet,	1900
	Hamilton, Dr J. R., Hawick,	1879
	Hamp, Dr J. Walton, Penn Road, Wolverhampton,	1886
175	Hardie, Dr Thomas, 10 John's Place, Leith,	1870
	Harlin, Dr Francis W., Leith Hospital,	1900
	Harvey, Dr Charles E., Kingswood, Sav-la-Mar, Jamaica, W.I.,	1889
	Harvey, Dr James, 7 Blenheim Place,	1891
	Haultain, Dr F. W. N., 17 Rutland Street,	1884
180	Havelock, Dr J. G., Sunnyside, Montrose,	1888
	Hay, Dr Henry, 19 Nelson Street,	1879
	Helm, Dr J. H., Ratho,	1888
	Helm, Dr R. Dundas, 13 Portland Square, Carlisle,	1892
	Helme, Dr G. Edgar, Gloucester House, Rusholme, Manchester,	1895
185	Henderson, Dr Alexander, 21 Pitt Street,	1891
	Herring, Dr Percy T., Physiological Laboratory, University of Edinburgh,	1899
	Hewetson, Dr J., Holmfield, Reigate,	1881
	Hindmarsh, Dr Edwin, Mozufferpore, Tirhoot State Railway, Bengal, India,	1895
	Hirst, Dr George S. S., Withern, Alford, Lincolnshire,	1894

		Date of Admission.
190	Hobson, Dr H. Overton, 38 Leinster Gardens, Hyde Park, London, W.,	1901
	Hoggan, Dr R., Bessville, Liberton,	1894
	Holmested, Dr C. W., Tuxford, Newark, Notts,	1900
	Hooper, Dr J. W. D., 70 Collins Street, Melbourne, Australia,	1884
	Hughes, Dr H. L., Gwernllwyn House, Dowlais, Glamorganshire,	1894
195	Hughes, Dr P. T., The Heath Asylum, Bexley,	1895
	Hunter, Dr George, 33 Palmerston Place,	1881
	Hutcheson, Dr J., 44 Moray Place,	1888
	Inch, Dr Robert, Gorebridge,	1887
	Inglis, Dr Elsie M., 8 Walker Street,	1901
200	Jamieson, Dr Hugh, 13 Rutland Street,	1889
	Jamieson, Dr James, 43 George Square,	1866
	Jamieson, Dr J. Boyd, 43 George Square,	1900
	Jardine, Dr Robert, 5 Clifton Place, Glasgow, W.,	1897
	Jeffrey, Dr John, Glen Bank, Jedburgh,	1901
205	Johnston, Dr R. J., 1 Buccleuch Place,	1899
	Keiller, Prof. Wm., 1523 Thirty-first Street, Galveston, Texas, U.S.A.,	1890
	Ker, Dr C. B., City Fever Hospital,	1894
	Kerr, Dr J. M. Munro, 28 Berkeley Terrace, Glasgow,	1894
	Kerr, Dr J. W., 121 Trinity Road,	1901
210	King, Dr J. K., The Glen Springs Sanitorium, Watkins, New York, U.S.A.,	1884
	Kirk, Dr Robert, Bathgate,	1887
	Krüger, Dr C. H., Main St., Wynberg, Cape Colony, S. Africa,	1899
	Kynoch, Professor Campbell, 8 Airlie Place, Dundee,	1892
	Lackie, Dr James, 1 Randolph Crescent,	1889
215	Laing, Dr J. H. A., 11 Melville Street,	1891
	Langwell, Dr H. G., 5 Hermitage Place, Leith,	1891
	Lee, Dr Herbert E., Gunnedah, N.S.W., Australia,	1892
	Leigh, Dr J. Dickinson, 7 Avenue Road, Falsgrave, Scarboro',	1886
	Leith, Dr Robert M., Provincial Hospital, Port Elizabeth, Cape Colony, South Africa,	1896
220	Liddell, Dr J., North View, Victoria Avenue, Harrogate,	1893
	Linton, Dr John, 60 George Square,	1863
	Linton, Dr Simon, Grangemouth,	1887
	Littlejohn, Dr Harvey, 1 Atholl Crescent,	1890
	Lockhart, Dr F. A. L., 23 Mackay Street, Montreal, Canada,	1890
225	Lucas, Dr Robert, Dalkeith,	1871
	Lyle, Dr F. W., 97 Gordon Road, Ealing, London, W.,	1890
	Lyle, Dr R. P. Ranken, 20 Saville Road, Newcastle-on-Tyne,	1901
	M'Arthur, Dr W. Taylor, 1014 S. Figueroa Street, Los Angeles, California,	1901
	M'Brearty, Dr James W., Greymouth, West Coast, New Zealand,	1899
230	M'Call, Dr John, 9 Windsor Street,	1886
	M'Callum, Dr H., Kinloch-Rannoch,	1887
	M'Cann, Dr F. J., 5 Curzon Street, Mayfair, London, W.,	1896
	Macdonald, Dr Alexander, 42 Polwarth Terrace,	1898
	Macdonald, Dr Angus, 31 Rutland Square,	1897
235	Macdonald, Dr W. B., Rockcliff, Dunbar,	1887
	Macdonald, Dr W. Fraser, 16 Buckingham Ter., Glasgow, W.,	1884
	MacGregor, Dr A. V., Durham House, Victoria Road, Hartlepool,	1895
	Macgregor, Dr Donald, Springmount, Jedburgh,	1900
	Macgregor, Dr G. S., 2 Burnbank Terrace, Glasgow,	1888
240	MacGregor, Dr Jessie M., 8 Walker Street,	1901
	Mackay, Dr George, 74 Bruntsfield Place,	1879
	Mackay, Dr W. B., 23 Castlegate, Berwick-on-Tweed,	1899
	Mackenzie, Dr R., Napier, Nairn,	1887
	Mackenzie, Dr T. C., Culrain, Rosshire,	1900

		Date of Admission.
245	M'Kerron, Dr R. Gordon, 1 Albyn Place, Aberdeen,	1896
	Mackie, Dr George, 3 Panmure Terrace, Montrose,	1900
	Mackin, Dr Patrick, 102 Cuba St., Wellington, New Zealand,	1895
	Mackness, Dr G. O. C., Fort Street House, Broughty-Ferry,	1887
	M'Larty, Dr Malcolm, 7 Bellevue Place,	1900
250	M'Lean, Dr Archibald, Crosshouse, Kilmarnock,	1890
	Macmillan, Dr John, 48 George Square,	1897
	M'Murtry, Dr L. S., 231 West Chesnut Street, Louisville, Kentucky, U.S.A.,	1889
	MacRae, Dr John, Lynwood, Murrayfield,	1893
	MacVie, Dr S., Chirnside,	1881
255	M'Watt, Dr John, Duns,	1879
	Macwatt, Dr R. C., 7th Bengal Cavalry, care of Messrs King, King & Co., Bombay,	1885
	Maddox, Dr Ralph H., I.M.S., Chapora, Saran, Bengal,	1887
	Mair, Dr Robert, 15 Oliver Crescent, Hawick,	1897
	Malcolmson, Dr Harold, No. 9 "C" Road, Mandalay, Burma,	1898
260	Manford, Dr J. S., 70 Osborne Road, Newcastle-on-Tyne,	1900
	Marshall, Dr G. Balfour, 19 Sandyford Place, Glasgow,	1891
	Marshall, Dr William, Milnathort,	1884
	Martin, Dr Charles, Dagenham House, Newton Abbot, South Devon,	1892
	Martin, Dr J. W., Burnfoot, Cluden, Dumfries,	1887
265	Martine, Dr W. R., Weston, Haddington,	1896
	Matheson, Dr A. A., 41 George Square,	1887
	Matheson, Dr Roderick M., 2 Kingswood Grove, Douglas, Isle of Man,	1897
	Matthew, Dr Alexander, Corstorphine,	1885
	Maurange, Dr Gabriel, 6 Rue de Tournon, Paris,	1898
270	Melville, Dr Kenmure, 50 Comiston Drive,	1900
	Menzies, Dr David, 20 Rutland Square,	1877
	Messer, Dr Fordyce, Helensburgh,	1866
	Michael, Dr Gustave, 5 Cambridge Place, Chestergate, Regent's Park, London, N.W.,	1885
	Millard, Dr W. W., 3 George Place,	1884
275	Miller, Dr W. H., 51 Northumberland Street,	1886
	Milligan, Dr D., 11 Palmerston Place,	1893
	Milne, Dr W. M., 14 Newington Road,	1898
	Mitchell, Dr G. B., 1 Skinner Street, Whitby,	1893
	Mitchell, Dr R. M., 2 Gloucester Place,	1900
280	Montgomery, Dr John, The Highlands, Balsall Heath, Birmingham,	1895
	Moorhouse, Dr J. Ernest, 1 Glebe Avenue, Stirling,	1892
	More, Dr James, Rothwell, Kettering, Northampton,	1880
	Morison, Dr Albert E., Wellington Road, West Hartlepool,	1888
	Morris, Dr S. Glanville, Plâs Cwmtwrch, Nantgaredig, South Wales,	1894
285	Moses, Dr O. St John, 159 East Dulwich Grove, London, S.E.,	1900
	Mowat, Dr John, 6 Buccleuch Place,	1884
	Munro, Dr A. Watson, 183 Liverpool Street, Sydney, Australia,	1892
	Munro, Dr J. R., Infirmary and Dispensary, Bolton,	1901
	Murray, Dr A. Lang, 32 Duddingston Park, Portobello,	1889
290	Murray, Dr D. R., 41 Albany Street, Leith,	1878
	Murray, Dr James, 1 Brandon Street,	1879
	Murray, Dr R. Milne, 11 Chester Street,	1880
	Nairne, Dr J. Stuart, 141 Hill Street, Garnethill, Glasgow,	1889
	Napier, Dr A. D. Leith, North Terrace, East, Adelaide, South Australia,	1878
295	Nicholson, Dr H. Oliphant, 20 Manor Place,	1900
	Nisbet, Dr W. B., Townsville, N. Queensland, Australia,	1886
	Oakes, Dr Arthur, 4 (first floor) Marina Court, Bexhill-on-Sea,	1879
	Ogden, Dr O. Watson, 131 Sandyford Road, Newcastle-on-Tyne,	1900

		Date of Admission.
	Ogilvy, Dr Stewart Grant, Addiewell	1892
300	O'Gorman, Dr Patrick W., 17th Bengal Infantry, Benares, N.-W. Provinces, India, ...	1899
	Oliphant, Dr E. H. Lawrence, 23 Newton Place, Glasgow, .	1885
	Orr, Dr John, Heather Lea, Clarendon Road, Eccles, Lancash.,	1887
	Orr, Dr W. Basil, 13 Braid Road, ...	1889
	Paterson, Dr G. Keppie, 19 Albany Street, . . .	1882
305	Paterson, Dr G. W. Simla, 147 Bruntsfield Place, . .	1896
	Peddie, Dr H. Anderson, 24 Palmerston Place, . .	1882
	Pereira, Dr A. A. Jervis, Surgeon to the Delagoa Bay Railway, Lourenço Marques, Delagoa Bay, South Africa, . .	1888
	Perigal, Dr A., New Barnet, Herts, ...	1887
	Pirie, Dr John, 15 Ardmillan Terrace, . . .	1888
310	Playfair, Dr John, 5 Melville Crescent, . . .	1873
	Poole, Dr T. D., Aberdeen Cottage, Poulton-le-Fylde, .	1890
	Porritt, Dr E. E., Wanganui, New Zealand, . . .	1897
	Porteous, Dr J. Lindsay, 83 Warburton Avenue, Yonkers, New York, ...	1875
	Potts, Dr W. A., 160 Hagley Road, Edgbaston, Birmingham,	1897
315	Price, Dr A. W. Gordon, 9 Grange Road, . . .	1890
	Price, Dr E. F. T., 1 Middleby Street, . . .	1890
	Primrose, Dr Alex., 100 College Street, Toronto, Canada, .	1887
	Pringle, Dr J. Hogarth, 172 Bath Street, Glasgow, . .	1886
	Proudfoot, Dr Thomas, 30 Lauriston Place, . . .	1884
320	Rattray, Dr A. M. T., Portobello, ...	1869
	Reid, Dr J. M., 5 Ravelston Park, ...	1901
	Reid, Dr W. L., 7 Royal Crescent, Glasgow, W., . .	1880
	Reid, Dr W. Spence, Oakley, Kirkcudbright, . . .	1880
	Rendell, Dr Herbert R., P.O. Box 606, St John's, Newfoundland, ...	1882
325	Rhodes, Dr J. H., Greenside, Kendal, . . .	1898
	Richardson, Dr William, 66 Cotham Road, Bristol, . .	1888
	Ritchie, Dr A. Brown, 117 Boston Street, Hulme, Manchester,	1892
	Ritchie, Dr James, 22 Charlotte Square, . . .	1880
	Ritchie, Dr R. Peel, 1 Melville Crescent, . . .	1861
330	Ritchie, Dr W. T., 9 Atholl Place, ...	1899
	Roberton, Dr Ernest, Auckland, New Zealand, . .	1887
	Roberts, Dr Ernest T., 75 Skipton Road, Keighley, . .	1890
	Roberts, Dr R. W., Cattybrook House, Cwmavon, near Port Talbot, South Wales, ...	1894
	Robertson, Dr George, Rolland House, Dunfermline, . .	1901
335	Robertson, Dr John A., Matjesfontein, Cape Colony, South Africa, ...	1892
	Robertson, Dr Robert, 26 Royal Circus, . . .	1897
	Robertson, Dr W. B., St Anne's, Thurlow Park Road, West Dulwich, London, S.E., ...	1870
	Robertson, Dr W. G. Aitchison, 26 Minto Street, . .	1889
	Robins, Dr H., Sav-la-Mar, Jamaica, W.I., . . .	1893
340	Robinson, Dr H. Shapter, Talfourd House, 78 Peckham Road, Camberwell, London, S.E., ...	1890
	Robson, Dr B. S., 66 Brighton Grove, Newcastle-on-Tyne, .	1887
	Ronaldson, Dr T. R., 8 Charlotte Square, . . .	1877
	Rosa, Dr Albert F., 28 Pitt Street, ...	1893
	Russell, Dr W., 3 Walker Street, ...	1890
345	Sandstein, Dr Alfred C., Gesto House, Edinbane, Isle of Skye,	1898
	Sapara, Dr Oguntola, Broad Street, Lagos, W. C. Africa, .	1895
	Saunders, Dr F. A., Grahamstown, Cape Colony, South Africa,	1885
	Schofield, Dr L. J., Warrensburg, Mo., U.S.A., . .	1893
	Scott, Dr T. R., Musselburgh, ...	1880
350	Shaw, Dr W. J., Cockburnspath, ...	1892
	Shearer, Dr Alfred, Sunnybank, Stronsay, Orkney, .	1898
	Simpson, Dr F. D., 14 Garscube Terrace, Murrayfield, .	1900

		Date of Admission.
	Simpson, Dr W. Petrie, The Elms, Coningsby,	1892
	Simson, Dr Harry, 13 Grosvenor Street,	1897
355	Slight, Dr J. D., 2 Durham Road, Portobello,	1898
	Sloan, Dr Allen T., 22 Abercromby Place,	1893
	Sloan, Dr S., 5 Somerset Pl., Sauchiehall St. West, Glasgow,	1887
	Smart, Dr David, 74 Hartington Road, Sefton Park, Liverpool,	1882
	Smith, Dr G. H. Walton, Pendower, Oxford St., Paddington, Sydney, Australia,	1892
360	Smith, Dr Gains T., Moncton, New Brunswick, Canada,	1891
	Smith, Dr James, 4 Brunton Place,	1891
	Smith, Dr John, Brycehall, Kirkcaldy,	1885
	Smith, Dr J. Gordon, Akuse, Accra, Gold Coast, West Africa,	1892
	Smith, Dr William, 14 Hartington Gardens,	1890
365	Smith, Dr W. Ramsay, Central Board of Health, Adelaide, South Australia,	1892
	Sneddon, Dr William, 58 Bonnygate, Cupar-Fife,	1888
	Somerville, Dr Robert, 12 Abbotsford Road, Galashiels,	1881
	Spalding, Dr William, Gorebridge,	1867
	Spence, Dr R., St Ninians, Burntisland,	1878
370	Spence, Dr William. Dollar,	1884
	Stephen, Dr W. A., Loftus-in-Cleveland, Yorkshire,	1894
	Stephenson, Dr W. H., 137 Rochdale Road, Harpurhey, Manchester,	1895
	Stevens, Dr John, 2 Shandon Street,	1894
	Stewart, Dr J. S., 15 Merchiston Place,	1884
375	Stewart, Dr R., 42 George Square,	1885
	Stirling, Dr R., 4 Atholl Place, Perth,	1892
	Stirling, Dr Stewart, 4 Coates Crescent,	1866
	Story, Dr B. S., 6 Annfield Terrace, Annfield Plain,	1898
	Sturrock, Dr J. F., Arima, Broughty-Ferry,	1887
380	Sym, Dr A. C., 144 Morningside Road,	1885
	Taylor, Dr David R., St Helen's, Ayton,	1896
	Taylor, Dr William, 12 Melville Street,	1868
	Taylor, Dr W. Macrae, 12 Melville Street,	1895
	Teacher, Dr C., 8 Nile Grove,	1887
385	Temple, Dr G. H., Ailanthus, Weston-super-Mare,	1888
	Thatcher, Dr C. H., 8 Melville Crescent,	1877
	Thin, Dr Robert, 38 Albany Street,	1891
	Thomas, Dr G. W., Swainswick, Bath,	1899
	Thompson, Dr James L., Castlemaine, Victoria, Australia,	1894
390	Thomson, Dr A. D. R., Musselburgh,	1877
	Thomson, Dr John, 14 Coates Crescent,	1887
	Thomson, Dr J. Stitt, The Mount, Lincoln,	1877
	Thyne, Dr T. J., 2 Dean Terrace,	1887
	Tod, Dr John, 93 Ferry Road, Leith,	1892
395	Tough, Dr F. W. K., 12 Primrose Street, Leith,	1901
	Tristan, Dr R. J., 28 Carolgate, Retford, Notts,	1887
	Underhill, Dr C. E., 8 Coates Crescent,	1872
	Underhill, Dr Frederick T., 1373 Barclay Street, Vancouver, British Columbia,	1885
	Underhill, Dr T. Edgar, Dunedin, Barnt Green, Worcestershire,	1879
400	Vassie, Dr Alexander H., 98 Priory Road, West Hampstead, London, N.W.,	1891
	Vickery, Dr W. H., 52 Elswick Road, Newcastle-on-Tyne,	1892
	Wade, Dr George, Melrose,	1893
	Walker, Dr A. Wallace, 24 Forth Street,	1886
	Wallace, Dr Abraham, 39 Harley Street, London, W.	1879
405	Watson, Dr Douglas Chalmers, 22 Coates Crescent,	1897
	Watson, Dr P. H., 2 Victoria Square, Newcastle-on-Tyne,	1887
	Watson, Dr R. H., The Glebe, Hamilton,	1896
	Waugh, Dr John, 36 Finsbury Pavement, London, E.C.,	1881
	Webster, Dr A. D., 5 Blacket Avenue,	1881

		Date of Admission.
410	Webster, Prof. J. C., 706 Reliance Building, 100 State Street, Chicago, U.S.A.,	1889
	Whyte, Dr J. Curtis, Dalkeith,	1896
	Wilcockson, Dr G. Morton, 183 Southampton Street, Reading,	1893
	Wilkie, Dr James, Selville House, Portobello,	1897
	Wilkinson, Dr George, 109 Park Road, Liverpool,	1889
415	Wilson, Dr James, 53 Inverleith Row,	1889
	Wilson, Dr T. D., 10 Newington Road,	1879
	Wise, Dr Robert, 5 Weston Park, Crouch End, London, N.,	1890
	Wood, Dr Russell, 9 Darnaway Street,	1880
	Wood, Dr Thomas, 67 Ferry Road,	1886
420	Wood, Dr William, 19 Roxburgh Street,	1892
	Woodside, Dr J. T., 5 Roden Ter., Woodstock Road, Belfast,	1898
	Wright, Dr W. F., Bonnington Mount, Bonnington Terrace,	1887
	Yoe, Dr Richard T., 2103 Floyd Street, Louisville, Kentucky, U.S.A.,	1891
	Young, Dr H. C. Taylor, 209 Macquarie Street, Sydney, New South Wales,	1900
425	Young, Dr Peter, 43 Heriot Row,	1859
	Young, Dr Peter A., 25 Manor Place,	1871
	Young, Dr R. J. Erskine, 24 Comely Bank,	1892

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TRANSACTIONS

OF THE

EDINBURGH OBSTETRICAL SOCIETY,

FOR SESSION 1900–1901.

BOSTON MEDICAL LIBRARY JUL 11 1907

MEETING I.—NOVEMBER 14, 1900.

Dr R. MILNE MURRAY, *President, in the Chair.*

I. *The Treasurer* (*Dr W. Craig*) made his annual statement, which is given below:—

INCOME.						
Balance from Session 1898–99,					£448	11 0
Arrears,	£8	5	0			
Bank Interest on Deposit Receipts,	6	4	10			
Interest on Consols,	6	14	2			
Entrance Fees from 9 new Ordinary Fellows,	9	9	0			
Annual Contributions from 342 Ordinary Fellows,	85	10	0			
Composition for Life-Membership from 1 Ordinary Fellow,	5	5	0			
Transactions sold,	5	6	1			
					126	14 1
					£575	5 1
EXPENDITURE.						
Bank Cheque Book,	£0	2	6			
Royal Medical Benevolent College,	5	5	0			
J. P. Kennedy, Shorthand Reporter,	3	3	0			
Commission to Collector,	1	7	6			
Fraser's Account,	0	12	0			
Door-keeper's Salary, etc.,	1	2	6			
Carriage of Parcels, etc.,	0	0	10			
Oliver & Boyd's Account for Vol. XXV. of Society's Transactions (510 copies),	80	6	7			
Oliver & Boyd's Account for Printing Billets, Postages, etc.,	21	13	10			
Rent of Rooms at 5 St Andrew Square,	4	10	0			
Waterston & Sons' Account,	3	15	3			
The Secretaries and Editor for Postages,	1	2	3			
					£123	1 3
Balance to New Account,[1]					452	3 10
					£575	5 1

[1] Of this Balance the sum of £250, 10s. 6d. is invested in 2¾ per cent. Consols.

The accounts were audited by Drs Wm. Taylor and Boddie, and found correct.

In presenting his report the Treasurer gave the following account of the gradual growth of the Society's funds, and of the publication of the Annual Transactions:—

The Society commenced the past session with a balance in its favour of £448, 11s. The total income for the session was £126, 14s. 1d. The total expenditure (including £5, 5s. for the Royal Benevolent College) was £123, 1s. 3d. It will thus be seen that the income has exceeded the expenditure by £3, 12s. 10d., which sum added to the balance from the preceding session makes £452, 3s. 10d., with which to begin the present session.

Having now completed twenty-five years as your Treasurer, I hope it is not out of place to contrast briefly the state of the finances of the Society at present with what they were a quarter of a century ago, when I had the honour of being appointed your Treasurer.

The balance in favour of the Society twenty-five years ago was £20, 12s. 11d. It is now £452, 3s. 10d., an increase of £431, 10s. 11d. But this by no means represents the whole of the increase, for it must be borne in mind, that, for twenty-three years, the Fellows of the Society have received copies of the Transactions delivered free at the houses, and for the last twenty of these years, the volume has been beautifully bound. This has been accomplished without increasing either the entrance fee or the annual subscription. The reason why the Society has been able to accomplish all this is the fact that each Ordinary Fellow receives a copy of the Transactions *free*, irrespective of the quarter of the globe in which he may reside.

The history of the publication of the Transactions may interest the younger Fellows of the Society:—

Volume I., which contains the Transactions for Session 1868-69, was published in 1870 at 7s. 6d. per volume, but only 5s. was charged to Fellows of the Society. The Society lost fully £40 by this transaction.

Volume II., which contains the Transactions for Sessions 1869-70 and 1870-71, was published in 1872 at 15s. per volume, but only 10s. 6d. to Fellows of the Society. By

this transaction the Society lost fully £40, and at the end of Session 1872-73 was in debt to the bank £17, 16s.

Volume III., which contains the Transactions for Sessions 1871-72, 1872-73, and 1873-74, was published in 1875 by Messrs Maclachlan & Stewart entirely at their own risk (for the Society had no funds for such a purpose). The price was 15s., but only 10s. 6d. to the Fellows of the Society. By this transaction Messrs Maclachlan & Stewart lost fully £30, and positively refused to publish any more volumes. As the Society had no funds with which to carry on the publication of the Transactions, a motion was made to increase the annual subscription for this purpose, but fortunately this motion was rejected.

Volume IV., which contains the Transactions for Sessions 1874-75, 1875-76, and 1876-77, was published in 1878. The Society undertook the whole expense of the publication of this volume after receiving subscriptions of half-a-guinea from about 40 Fellows. Only about 80 copies were printed. This volume cost the Society £83, 6s., but with subscriptions and sales has realised £64, 18s. 6d ; so that the total loss was only £18, 7s. 6d., or £2, 5s. 5d. less than what the Society possessed in November 1875.

The Transactions for Session 1877-78, and the two following Sessions, were sent annually free to all the Fellows, but only in paper cover. This experiment of sending the Transactions free to all the Fellows proved so successful financially that at the end of three years the Society resolved to bind the volumes, and this has been done for the past twenty years, during which time the funds of the Society have increased from £62, 2s. 9½d. to £452, 3s. 10d., an increase of £390, 1s. 0½d.

The Membership of the Society is about four times greater than it was twenty-five years ago. There can be no doubt that the increase in membership and finances has been mainly due to the *free* distribution of the Transactions.

I trust these facts will prove a stimulus to the Fellows of the Society to make the Transactions more and more valuable, so that during the next quarter of a century the prosperity of the Society may be even greater than in the past.

Dr Halliday Croom proposed, and *Dr Berry Hart* seconded, a hearty vote of thanks to Dr Craig for his invaluable services as Treasurer during the last twenty-five years, and the *President* conveyed to him the high appreciation of the Society, and their cordial congratulations on his Twenty-fifth Annual Report.

Dr Craig returned his warm thanks.

II. The Society then proceeded to the election of Office-bearers for the present session, and the President announced the result as follows:—*President*, Dr R. Milne Murray; *Vice-Presidents* (*Senior*), Dr MacVie (Chirnside), (*Junior*), Dr Haultain; *Treasurer*, Dr Wm. Craig; *Secretaries*, Dr Haig Ferguson and Dr W. Fordyce; *Librarian*, Dr Haultain; *Editor of Transactions*, Dr N. T. Brewis; *Members of Council*, Dr Halliday Croom, Professor Kynoch (Dundee), Drs Jas. Ritchie and Farr Armour, Professor Simpson, Drs J. W. Ballantyne, Boddie, and Lamond Lackie.

III. The following gentlemen were elected Ordinary Fellows of the Society:—T. Scott Brodie, M.B., C.M., Haywood, Lanarkshire; W. Hope Fowler, M.B., Ch.B., 5 St Vincent Street, Edinburgh; J. Stanley Manford, M.B., B.S., 70 Osborne Road, Newcastle-on-Tyne; Ogden Watson Ogden, M.D., 131 Sandyford Road, Newcastle-on-Tyne; John Craig, M.B., Ch.B., Royal Infirmary, Dumfries; Wm. Hartley Bunting, M.D., F.R.C.S.E., 74 Bruntsfield Place, Edinburgh; T. C. Mackenzie, M.B., Ch.B., Royal Maternity Hospital, Edinburgh; D. G. Hall, B.A., M.B. (Cantab.), M.R.C.S. (Eng.), etc., Royal Maternity Hospital, Edinburgh; H. C. Taylor Young, M.D. (Glasgow), Macquarie Street, Sydney, N.S.W.; John Boyd Jamieson, M.B., C.M., F.R.C.S.E., 43 George Square, Edinburgh; W. A. Johnstone Alexander, M.A., M.B., C.M., 1 George Place, Edinburgh; Malcolm M'Larty, M.B., C.M., 7 Bellevue Place, Edinburgh; P. J. H. Ferguson, M.B., C.M., 162 Montgomery Street, Edinburgh; Frederick Gardiner, M.B., C.M., 40 Rankeillor Street, Edinburgh.

IV.—PRESIDENTIAL ADDRESS.

By Dr R. Milne Murray.

In permitting me to open our sixty-second session by addressing a few remarks to you from this Chair, you give me an opportunity of expressing, in a formal, but in a very cordial manner, my thanks for the great honour you have done me in electing me to the presidentship of the Edinburgh Obstetrical Society. I assure you these are no empty words, for while I accepted with much diffidence the honour you did me in placing me in the position already occupied by so many eminent men, none of my predecessors in this office appreciated the honour more than I have done. It is indeed no small honour to preside over a society which has not only twelve years ago celebrated its jubilee, but which, during all these years of its existence, has filled the object of its institution so well, and has, year after year, contributed, in the most direct and concrete manner, to the establishment and progress of the science and art of obstetrics.

We are not likely to forget that most of the epoch-making contributions to our art of masters like Sir James Simpson and Matthews Duncan, to name only two of those who have gone from us, have been first communicated to our Society, and I doubt if any other association, dealing with this department of medicine, can point to a record of work so sustained and of such value as this Society can show.

The origin of our Society dates from a meeting held in the New Town Dispensary on 4th December 1839, at which preliminary matters were arranged, and the Society was actually constituted at the first formal meeting held on 13th January 1840.

The object of the Society was expressed in its first law, which read as follows:—"The object of the Edinburgh Obstetrical Society shall be to advance Obstetrical Medicine by holding meetings for the purpose of receiving communications and conversing on subjects connected with that branch of the profession."

It is not a little interesting to notice how very largely in its early years the Society was concerned with matters

relating to obstetrics and how small a proportion of its time was occupied by subjects relating to gynæcology, in the strict sense of the term. The first volume of the minutes, which contains the records of the Society for its first fifteen years, shows only an occasional reference to a gynæcological subject. An occasional specimen of a fibrous tumour, usually obtained post-mortem, a discussion on dysmenorrhœa, or a mode of treating a displacement of the uterus, represent the chief reference to this department. On the other hand, though during these years and for long after the Society did not publish its Transactions, one can see from the minute-book how keen was the interest of its members in scientific and practical midwifery. Communications relating to almost every department were made; such as the structure of the decidua, of the corpus luteum, the causation of convulsions, of puerperal fever, and the management of almost every complication from a rigid perineum to a deformed pelvis.

If on the other hand we turn to the Transactions of the last fifteen years we find a very different state of matters. The great advance which during this period has been made in the department of diseases of women has impressed itself on our records in a very definite manner. So much is this the case that papers relating to the diseases of women have become more and more important and numerous, and there seems a danger that the impulse to explore new fields, and to win new triumphs in the department of gynæcology, may unduly divert our attention from the claims of obstetric medicine, and diminish our interests in the many unsolved problems it still presents to us. One sometimes has reason to fear that there is a growing impression in the mind of the student that the subject of obstetrics as a field of scientific inquiry is already closed, that its science and art are complete, and that it presents little inducement to the young and ardent inquirer eager to grapple with the unknown, and to win glory in scientific discovery or surgical achievement. On the contrary, a brief acquaintance with obstetrics, either as a practitioner or as a teacher, brings us in contact with problems whose solution would glorify the most ambitious enthusiast, and assure the transmission of his renown to many generations. It would be

a grievous misfortune if such an idea as this should gain ground, or that the minds of inquirers should be diverted from investigations, the results of which would mean benefits incalculable to the human race.

It may appear to some of you that the present opportunity I have of addressing you, occurring as it does within a few weeks of the close of the century, might be best employed in reviewing in detail the progress of obstetrics and gynæcology during its course. Such a review would be, no doubt, highly appropriate, but I feel that it is certain to be done more than once by others equipped with fuller knowledge and greater skill than I can claim. I would rather, if you will permit me, employ the time at my disposal in endeavouring to emphasize the importance of obstetrical knowledge to humanity in its bearing, which has been recognised from all time, on the welfare of the individual and of the race, and in doing so to direct attention to some of the many problems which await solution in the century which we are about to enter upon.

Of the two great biological functions—nutrition and reproduction—the former first attracted the attention and interest of the scientific inquirer. The functions concerned in nutrition manifest simpler phenomena, which lie, as it were, before our eyes. They attract attention by their comparative simplicity and by their direct influence on the individual. Hence the naturalist was far advanced in his knowledge of the phenomena of nutrition before he turned seriously to those of the reproductive process. But we must also remember that it is not the mere difficulty of interpretation of the phenomena of reproduction which accounts for the ignorance of them which prevailed; in great measure we must look for an explanation of this ignorance in the effect of a great natural law. The light which Darwin threw on the workings of nature has given us a more correct perspective than we formerly possessed of the relationship of reproduction and nutrition. In the light of his work and the theory of evolution which it does so much to establish and illuminate, we are enabled to re-write the old aphorism that "Self-preservation is the first law of nature," in newer terms, and to say that "Reproduction is the first law of nature, while self-preservation is the first law of the individual." We

have but to look around to see this law manifesting itself on all hands, in the lowliest as in the most elevated of organisms. All life seems absorbed in a struggle between the race and the individual, a struggle to the death, and a struggle which involves pain and suffering and sacrifice on the one hand, a struggle which seems merciless and remorseless on the other.

Russel Wallace puts before us very clearly the vastness and intensity of this struggle, and I may quote his words: "The theory of natural selection rests on two main classes of facts which apply to all organised beings without exception, and which thus take rank as fundamental principles or laws. The first is, the power of rapid multiplication in geometrical progression; and the second that the offspring always vary slightly from the parent, though generally very closely resembling them.

"From the first fact or law there follows, necessarily, a constant struggle for existence, because while the offspring always exceed the parents in number, generally to an enormous extent, yet the total number of living organisms in the world does not, and cannot, increase from year to year. Consequently every year on the average, as many die as are born, plants as well as animals, and the majority die premature deaths.

"They kill each other in a thousand different ways: they starve each other by some consuming the food that others want; they are destroyed largely by the powers of nature—by cold and heat, by rain and storm—by flood and fire. There is thus a perpetual struggle among them, which shall live and which shall die, and the struggle is so tremendously severe, because so few can possibly remain alive—one in five, one in ten, often only one in a hundred or even one in a thousand."

Wherever we turn, or in whatever aspect we view nature, we become aware of this continual reproduction, and the ceaseless struggle among the products, the unfailing death of the weakling, the persistence of the fitter, only, however, to take part in the reproductive process, perpetuating the race and then to perish. The process is universal, it is potent among the amœba, and it is as potent among mankind. The simpler the environments, the simpler and more direct the condition of the struggle, the higher in the scale of organisation, and the

more complex the conditions, the more subtle and varied the modes of attack. And over all Nature calmly sits.

"So careful of the type she seems
So careless of the single life."

Here then is the *raison d'être* of medicine—the science and art of self-preservation. The indifference of nature is compensated by the instinct of the individual. The desire to live, the dread of destruction, are primary elements of our constitution; the regulation of our nutritive processes, the rectification of their anomalies, the conservation, in fact, of the individual, of the weak against the strong, is the primary purpose of medicine.

So it has come about that in the development of medicine these processes which are concerned in the preservation of the individual at first attracted its interest, to the comparative exclusion of those concerned in the conservation of the species. But as we ascend the scale of development the relations between the species and the individual become more intricate. Owing to the complexity of environment the reproductive process becomes slower, more complicated, more hazardous. In the lower animals the process of reproduction *per se* is simple and rarely involves immediate danger to the life of the parent. In man, on the other hand, the conditions are widely different. Owing to a variety of causes the risks to the individual in the very process of reproduction are immensely increased; it is not merely a struggle among the offspring, the parent may be sacrificed as well. Thus *ceteris paribus* the more highly developed the species the more liable it is to extinction. So arises the medicine of the reproductive process—the science and art of obstetrics.

Like the science of other departments of medicine, that of obstetrics is of comparatively recent origin, and of course the true art of obstetrics, based as it must be on scientific knowledge, only then began to arise. But long before this an empirical art existed, whose beginnings are lost in the remote past. The records of it are scanty and disconnected, but such as they are, they are sufficient to show us that its importance was widely recognised, and its practice, in some form, universal.

In early times and in primitive peoples the practice of

obstetrics would naturally be confined to women. In natural labours their duties would be simple and routine. At first friends and neighbours would perform the kindly office, but soon a separate class would spring up whose special aptitude or experience would inspire the parturient woman with greater confidence.

But though the birth of a child was of daily occurrence in the primitive community, the processes of pregnancy and labour were shrouded in inscrutable mystery. The pregnant woman only too well knew that in sorrow and labour would she bring forth her child, and that ere she had looked on its face, she herself might have passed out into the unknown; and on the other hand the barren wife heard the prattle of children's tongues and wondered why she should be cursed and desolate. It is to the mystery and danger with which the reproductive process is associated that we must look for the explanation of the close relation between ideas connected with reproduction and every primitive religion.

It is not easy for us with the myriad details which modern science and research bring before us, and which claim a share in our consideration, to realise how comparatively few are the phenomena which appeal to the primitive mind. Beyond those which affected his individual organism, such as hunger and thirst, heat, cold, wind, and rain, the most prominent objective phenomenon was undoubtedly the continuous process of decay and dissolution on the one hand, and the no less continuous process of revival on the other, which were everywhere present around him.

Year by year as the sun sank in the autumn sky he saw that the waning light and shortening day were accompanied by the drooping and decay of all nature. The ripened fruit fell, the leaves withered, the grass browned and shrivelled, and the earth passed, as it were, into a deep sleep. But when the spring returned and the sun mounted the heavens, nature awoke, the lengthening day and the increasing warmth stirred the sleeping earth, and from its bosom burst forth twig and leaf and flower. It is easy to understand how close to those engaged in husbandry seemed the relation of the sun to those alternate processes of decadence and revival, and to them the

Sun-god as the revivifying and regenerating influence became the first and most august object of adoration, for to the tillers of the soil the sun was the primal force in nature. But the worship of the generative principle was not confined to the husbandman. The same process of decay and death was present, not only in the vegetable, but in the animal world as well. The shepherd saw that among his flocks and herds, among the members of his family, the same process was at work. Man and beast grew old and died, but the tribe and the herd were maintained and augmented, for a steady and restless reproduction kept step with, and at times almost outstripped, the inevitable decadence and dissolution. And then it was borne in on him that the power and influence of his race, no less than the abundance of his wealth were dependent on this principle, the ceaseless revivifying influence of nature.

In various ways and in different localities this idea found local and special expression. Such expression was found in the worship of the Sun, Tree, Serpent, and Phallus, one or other of which constitutes an essential element of every primitive religion, for these consist fundamentally in the invocation or propitiation of the generative or procreative principle. Hence arose temples and shrines to tutelary deities where their help could be secured by prayers or their anger averted by sacrificial offerings. To these temples came the suppliant for advice or assistance. Not only the herdsman to propitiate the god and to secure the increase of his flock, and the husbandman to present his first-fruits and to pray for the due reward of his toil, but also the pregnant woman that she might safely pass through the perils of childbed, and the barren woman that she too might be blessed and see her children around her. About fifteen miles from Rome the Appian way passes close to the Lake of Nemi. By it, in ancient times, stood the far-famed Arician Grove, sacred to Diana. The priest of this Grove was an escaped slave who had secured his position by the slaughter of his predecessor. To the altar served by this Priest-king, as he was called, flocked suppliants from many parts. Chief among these were barren women desirous of children, and pregnant women seeking an

easy delivery. It is worthy of note that these came not to a shrine of Juno, Venus, or even of Demeter, but to that of the chaste Diana, the one virgin goddess of the classic mythology.

On a clear spring day last year I stood on the great platform in front of the church of San Pietro in Monitorio. Looking across the domes and palaces of the Eternal City I could see on the slope of the Alban Hills the spot where stands the village of Nemi, near by the site of the famous Grove, and my thoughts went back to the troops of women, who, more than twenty centuries before, had sought the help of the virgin deity at her shrine. A little later I turned into the church, and as I passed the altar of "Our Lady" a poor woman, far advanced in pregnancy, rose from her knees before it. It required no great insight to divine the subject of her prayers, and I could not but ponder on this pathetic link with the past, for of old the Pagan craved the succour of the virgin goddess in her Grove, and to-day the Christian breathes her prayer at the altar of the Virgin-Mother of her Lord.

It is not then difficult to understand how close must have been the relation between primitive religion and the primitive medicine of the reproductive process. The inscrutable mystery which enfolded, and the constant peril and suffering which attended upon, pregnancy and parturition, must have inevitably driven the pregnant woman to seek the favour of the tutelary god, and the priest became at once her intermediary and her adviser. If a prayer or an incantation was all he could offer, it must still have proved a solace to many a suppliant, ignorant of natural laws and causes, and about to enter on her great trial. If the labour proved normal and its necessities were met by the skill of her neighbours, the help of the god would be acknowledged by the votive gift; if disaster attended her there was no help for it, she must bow before the anger of an unappeased deity. The death of the mother or child at birth was regarded, not as the result of a diseased or abnormal state of the body, but as the curse of a god whose favour must be secured ere the danger could be averted. The priest who prescribed the mode of atonement played the part of the physician so far as the disorders of pregnancy and labour were concerned, and thus in a sense our art took its origin, if I may

use the term, "within the pale of the church." No doubt in course of time the office of the physician became detached from the purely priestly function, and in Egypt as early as B.C. 3500 we know that a class of priest-physicians existed, whose duties were mainly concerned with the bodily ailments of their suppliants, and especially with those of pregnant women.

But there comes a time when the thick canopy of ignorance and superstition is pierced by fitful gleams of truth and knowledge. Processes which were at first hidden and mysterious become revealed in part, and it becomes gradually borne in on the awakening intelligence that what appeared to be the freak of a god is the expression of part of the complex order of the universe. Recurring phenomena are observed and corelated, and expectation and action are regulated thereby.

And so it comes about that even in the subdued light, yielded by the first glimmerings of scientific observation, the mysterious processes of pregnancy and parturition were found in the main to follow a certain well-defined course, and where deviation arose an explanation and a remedy were sought and sometimes found. In this way was laid the foundation of our art, crude and empirical it was at first, and for many centuries it remained so, but its foundation was laid when men shook themselves free from the burden of superstition and observed and pondered for themselves.

The earliest compend of our art is to be found in the Hippocratic writings. This may be supposed to have focussed the practice of midwifery at the time of Hippocrates (B.C. 400). But centuries before that period some form of obstetric art had been practised in Egypt and in Greece. In B.C. 715 Numa Pompilius had promulgated his *lex regia*, which ordained that if a woman died in pregnancy the child was to be cut out of her uterus. The teaching of Hippocrates, crude and fallacious as much of it was, represented most of the obstetric art of nearly 2000 years.

About the beginning of the Christian era the study of anatomy under the Ptolemies at Alexandria gave a new impulse to medicine. Many of the Hippocratic errors were rectified, and a distinct advance was made in the obstetric art.

To the knowledge of anatomy gained here is due the progress in obstetrics shown by the Greek physicians practising in Rome in the early years of this era.

The influence of this knowledge as seen in the works of Soranus, Galen, Aretæus, and Moschion, has been ably set forth in the learned paper which Dr Barbour communicated to this Society.[1]

But from the seventh century until the beginning of the sixteenth, obstetric art stood still. Indeed, after the fall of the Roman Empire it fell, like other arts, on evil days. All trace of the earlier teaching was lost with the knowledge of the anatomical principles on which it rested, and its practice passing into the hands of the lowest women, was regulated by superstition and gross ignorance.

But after 800 years dawn began to break. In the early years of the sixteenth century the School of Salerno inaugurated the teaching of anatomy, and the light shed thereby had its influence on the dark and degraded practice of obstetrics. Progress was at first slow, and its practice remained for long in the hands of women. But by anatomists like Vesalius Berengarius, Fallopius, and surgeons like Parè, a scientific basis was laid, and the knowledge of Soranus and Moschion rediscovered. Further, while ordinary labour was still attended by women, the surgeon was more and more frequently called to difficult cases.

If the sixteenth century is mainly characterised by research in anatomy, which created the scientific basis of obstetric art, the seventeenth century claims our interest in virtue of the great development in practical midwifery rendered possible by the invention of the forceps; though their use was not general till the early years of the next century. In 1668 Mauriceau published his treatise, which formed the text-book of the French school for many years, and towards its close Dèventer was preparing for publication his book, which in some respects may be considered the foundation of modern midwifery.

The eighteenth century was a period of rapid development, and in it we meet with a galaxy of names whose contributions

[1] "On Early Contributions of Anatomy to Obstetrics," *Trans. Edin. Obs. Soc.*, vol. xiv.

to the science and art of midwifery it would be difficult to over-estimate. In England, Smellie, Hunter, and Denman, in France, Levret and Baudelocque, in Germany, Roederer, contributed in no small measure to the elimination of empiricism and the establishment of the science and art of obstetrics.

What, then, was the state of the science and art of midwifery when the dawn of the nineteenth century broke?

The researches of anatomists during the three preceding centuries had secured an acquaintance with the reproductive organs, which, though defective and faulty in many details, yet served as a sound working knowledge for the obstetrician.

The observations of obstetricians themselves, such as Mauriceau, Levret, Smellie, and Hunter, among others, had secured a certain accurate familiarity with the phenomena of pregnancy and natural labour. Something more than a glimmering of the nature of the mechanism of parturition had been acquired by the work of Ould, and especially of Smellie and Levret. More or less definite ideas had been attained on the management of abnormal labours, such as breech and transverse cases. The indications for, and the mode of use of, the forceps had been so far determined, and some methods of embryotomy had been evolved and practised.

The Cæsarean operation had been performed, in some cases with success, but in the main with results so disastrous as to render its justifiability, save in the case of a dead mother, very dubious. While the management of placenta prævia was in a very unsatisfactory condition both as to methods and results, that of accidental hæmorrhage had been laid down on sound lines by Smellie.

The practice of midwifery, indeed, in this country was largely under the influence of the teaching of Smellie, and in France under that of Levret, and while it still contained much which was empirical, much was established on sound and scientific principles.

I have already said that I have no intention of reviewing the progress of our art during the closing century, but in order that we may duly appreciate the responsibilities under which we enter the coming one, it is necessary that I should refer to

three epoch-making contributions to our science and art for which the nineteenth century will ever be famous.

In 1818 Nægele of Heidelburg published his pamphlet on the "Mechanism of Labour." As the result of this unpretentious-looking *brochure*, one of the greatest, if not the greatest, contribution was made to scientific obstetrics. "No other work of equally small size," says Dr Tyler Smith, "ever exerted greater influence upon any branch of medicine than that of Nægele upon midwifery. It may be termed indeed the Euclid of Obstetrics." Making all allowance for certain errors, one may truly say that Nægele's work enabled the observer of a labour to become at once a scientific obstetrician, and thus to raise himself above the level of the ordinary midwife.

By its means he was able to diagnose the normal and abnormal—to predict and intervene with intelligence and precision. I am almost afraid that we who have been nurtured on the mechanism of labour from our youth up too often forget what we owe to Nægele. I for one have often marvelled when watching the evolution of the fœtal head in its course through the pelvis, that one man could have observed and noted with so much scientific acumen, not only the normal process, but its variants, and in this way have corelated and focussed the mass of incoherent observations which obstetricians had been collecting and puzzling over for nearly eighty years.

Thirty years later another epoch was reached, when in 1848 Simpson discovered that anæsthesia, whether produced by ether or by chloroform, may be used to soothe the suffering without interfering with the efficient progress of labour, and that moreover, the "divine balm," while robbing labour of half its terrors, enables the obstetrician to exhaust the resources of his skill and experience on behalf of suffering motherhood. It is one of the chief glories of our Society, not only that its records contain the first account of the use of anæsthesia in labour, but that he to whose genius we owe the true appreciation of what anæsthesia meant to mankind, and whose invincible energy, in the face of cant, prejudice, and stupidity, forced the whole world to accept the divine gift, was for many years the foremost Fellow and most unwearied worker in our Society.

Another period, this time of twenty-three years, elapsed

when Lister gave to the world the principles of antiseptic surgery. This achievement was no doubt rendered possible by the labours of Pasteur and others which had preceded it, but the glory is none the less Lister's, for the revolution which it has wrought in modern medicine is the direct outcome of his incessant labours and teaching.

It was not long ere the obstetrician realised what antiseptic methods meant for his art, and the results which have been attained by them in practical midwifery contribute by no means the smallest tribute to Lister's genius.

I have confined myself, as I have said, to the accentuation of these three great contributions to scientific and practical obstetrics. I have not attempted to note or specify the host of workers who have during the last hundred years been laboriously adding to our records of scientific discovery and practical achievement, who have each in their own way contributed to the making of obstetrics as it is.

Rather would I in the time that remains to me direct your attention to what has yet to be done for our science and art, and which awaits our endeavour in the century whose threshold we are about to cross.

And first, lest the scientifically minded among us may feel, as they sometimes seem to do, that there is no work awaiting them, let me just name some of the problems we have yet to solve, in the hope that one of them at least may seem worthy of their efforts.

Among these problems I would name the true significance of menstruation, and its relation to ovulation and conception; the function and destiny of the corpus luteum, and that perennial subject, the structure of the placenta; the true duration of pregnancy; the cause of labour; and the nervous mechanism of the uterus; the nature of the process concerned in the involution of the uterus; the cause of that obstetrical terror, eclampsia; and many other riddles of greater or lesser interest all awaiting solution, and worthy of the best efforts of the best minds among us.

That many of these will be made clear in the coming century I have no reasonable doubt. I would even hope that some of those whom I now address may hold the cord

which will lift the veil which hides their meaning from our eyes.

But, gentlemen, we as obstetricians enter upon the new century with a far heavier responsibility on us than is represented by our duty in scientific research, however immediately attractive or remotely important its application may be, and it is to this grave responsibility which in conclusion I would venture to draw your attention.

First let me ask you to take stock of the equipment which as practical obstetricians we profess to possess. We stand to-day "the heirs of all the ages," and in virtue of the labours of those who have gone before us, we claim that for every strictly obstetrical complication which can arise, with only perhaps one exception, we have at our disposal a procedure with which we can meet it, that, in fact, there is scarcely a peril which can beset a woman in travail, out of which we have not the means of rescuing her. Of course I speak of strictly obstetrical complications. There are accidental conditions, such as grave disorders of the nutritive apparatus, of the heart, lungs, kidneys, etc., which produce conditions with which obstetric medicine is at present powerless to deal.

But for all else (save perhaps eclampsia) we profess a remedy, provided always we are entrusted with the care of the patient in reasonable time. Malpresentation, malposition, deformed pelvis, of whatever degree, hæmorrhage of whatever sort, rupture of the uterus, each and all have their appropriate treatment which has been tested times and times again, and has stood the test with unqualified success. This, then, is the profession, and the reasonable profession made by the obstetrician to-day, armed as he should be with an accurate knowledge of obstetrics, and with anæsthetics and the technique of antiseptic surgery.

Surely, then, the trees of the Arician Grove are dead and withered, for no woman now need come to the shrine of the goddess; and surely also the Litany for "all women labouring of child" is obsolete and forgotten. Alas! it is not so, for the trees of the grove are green as ever, and the altar of the goddess is loaded with offerings, and the Litany goes up each day from trembling lips and sinking hearts; for every year,

in our land alone, nearly 5000 women fall and perish in the perils of childbed.

Where now is our proud boast? What are we to say for modern midwifery when we witness year by year this sacrifice of fifty hecatombs of the most precious lives in the whole community, most of them in the very prime of life, many of them already the mothers of helpless children. Are we to fall back on a counsel of despair and declare this to be the irreducible minimum? Surely by all that is reasonable, no!

Let us look at the facts a little more closely. Between the years 1847 and 1856, the average annual death rate from puerperal fever was 1·89 per 1000. During these years chloroform was coming into use but was by no means generally employed, and antiseptics had scarcely been thought of.

Between the years 1875 and 1884 the mortality from the same cause rose to 2·28 per 1000 births. By this time anæsthetics were in wide use and antiseptic methods had been taught and practised to a very great extent.

Between the years 1886 and 1895 the mortality had now risen to 2·46 per 1000. During this time anæsthetics and antiseptics may be supposed to have been almost universally practised.

TABLE I.—*Mortality from Puerperal Fever in England and Wales.*

		Mean deaths per 1000.
1847-1856	Early anæsthesia, No antiseptics.	1·8
1875-1884	Anæsthesia general, Early antiseptics.	2·28
1886-1895	Anæsthesia general, Antiseptics general.	2·46

These figures are sufficiently startling. They have been already discussed by Boxall, Cullingworth, Williams, and others, and that deaths from puerperal fever are increasing during the last forty or fifty years is undoubtedly true as it is appalling.

Attempts have been made to account for the great proportion of septic deaths in labour by the errors of practice of ignorant and ill-trained midwives. I cannot see how this is borne out by the facts. Are midwives proportionately more numerous and more densely ignorant now than they were fifty years ago? I cannot speak from personal knowledge of English practice, but I am quite sure that in Scotland far more labours are attended by medical men in proportion to midwives than was the case at the middle of the century. Let us see, then, how matters stand in Scotland.

TABLE II.—*Childbed Mortality in Scotland.*

	Accidents of Childbed.	Puerperal Fever.	Total.
1897	331	205	536
1898	351	227	578

Now had the increase in 1898 been proportional to the increase of population, the figures would have been 1897 = 536; 1898 = 540: an increase of four. Instead of that we have an increase of forty-two, more than ten times the normal. There is nothing to be gained by trying to explain these figures away, and the midwife, much as she has been compelled to play the part of the scapegoat, cannot carry this burden into the wilderness.

Are we then to conclude that so far as obstetrics is concerned, the discoveries of Simpson and of Lister are in vain, nay, rather, that it would have been better had neither of them lived? Let us look at another page of our record. We all know the frightful mortality which during the earlier part of this century seemed bound up with Maternity Hospital practice. I do not stop to recall the figures, but I ask you to look at the statistics of one of our great hospitals, the Rotunda, for the two years 1896-1897 and 1897-1898.

TABLE III.—*Rotunda Hospital.*

	Total Cases.	Mortality.	Per 1000.
1896-7	1448	2	0·13
1897-8	1513	6	0·39

A bright picture this is. Here, surely, we are as near as may be the "irreducible minimum," and Simpson and Lister are both justified and glorified.

Why, then, are the results of private practice so far behind those obtained in hospitals such as the Rotunda? Some may assert because the circumstances are different and conditions can be secured in one which are impossible in the other. That may be quite true. But then, on the other hand, why are the results of private practice becoming worse and worse in spite of all that has been done for our science and art during the closing century? How can this terrible mortality, connected with what ought to be a physiological process, go on increasing year by year in spite of improved sanitation and other civilised amenities, in spite of the advantage given us by accurate scientific knowledge, improvements in instrumental appliances, and increased practical skill? The explanation may be complex, but there must be some cause or causes at work to account for it, and this is the problem we have to face in the coming century. The process of parturition is becoming more and more hazardous, and obstetric art lies under a stigma, and does so deservedly, until the reason of it is discovered and this terrible sacrifice of human life is checked.

This is not the time to attempt an exhaustive analysis of the various causes which may be at work in producing the state which we now deplore, but I cannot conclude these remarks without asking your attention to one set of causes which I am convinced may account for a large part of this needless mortality. I feel sure that an explanation of much of the increase of maternal mortality from 1847 onwards will be found in, first, *the misuse of anæsthesia*, and second, *in the ridiculous parody which, in many practitioners' hands, stands for the use of antiseptics*. In a word, the use which has been made by many of two of the greatest blessings of humanity has converted them into little else than a curse. Before the days of anæsthesia interference was limited and obstetric operations were at a minimum, because interference of all kinds increased the conscious suffering of the patient. Thus forceps and turning were employed when natural efforts had failed, and such operations as the artificial dilatation of a rigid os were not

attempted until it became an urgent necessity. When anæsthesia became possible and interference became more frequent, because it involved no additional suffering, operations were undertaken when really unnecessary on the demand of the patient or for the convenience of the practitioner. And so complications arose and the dangers of labour increased. But the knowledge that this interference involved risks must have served as a salutary check to some extent. I doubt not that a split cervix, followed by a fatal hæmorrhage or a death from puerperal fever must have burned its lesson into more than one reflective conscience in these days. Then came the antiseptic era. Here was now the panacea for all the dangers of childbed. All that was necessary was to dip the instruments for a few minutes in a carbolic lotion, and the hands in one of half the strength for half the time, and all danger was at an end. The forceps were passed through an undilated os; if it tore slightly, no matter, the antiseptic made that quite safe. Turning was now a matter of mere manipulative skill—a clean hand in the uterus could do no harm. This is no mere caricature: and if it represents the methods of any reasonable proportion of practitioners what wonder the cup was so often filled with death? When we hear of men who admit that forceps cases represent 30 to 70 per cent. of their practice, we wonder what the antiseptic precautions are which they claim as their justification. Normal labour is a natural process which is best left to itself, and the less the patient is disturbed with the paraphernalia of obstetrics before or after, the better.

But the moment we interfere it becomes a complex and dangerous process, and it is simply because this is constantly being ignored that the death-rate of childbed is what it is to-day. Until men realise this and recognise the fact that the simplest obstetric operation demands not one whit less of care as to antiseptic precautions than is required of one before opening the abdomen, we shall get no further forward. A bruised or lacerated maternal canal is quite as susceptible to microbic attacks as the peritoneum, and probably more so. When the practical obstetrician realises his responsibility, and that no small share of this terrible maternal mortality of a certainty lies at his door, he has made the first step towards true

progress. When he realises that labour is a natural process which in the great majority of cases it is criminal to disturb; when he realises that every interference increases the inherent danger a hundredfold; and when under this consciousness he brings with him to the lying-in room all that is possible of those principles of antiseptic surgery which have been at the bottom of the triumphs of modern gynæcology, we shall not have long to wait for the lightening of the dark cloud which hangs over us now.

I have trespassed too long on your time, but I felt that the subject which has occupied me was one which pressed more for attention and consideration than any other I could think of, and I felt that however unworthy of the momentous question these remarks may be, no more appropriate audience or occasion could be found. During these last days of the dying century there will be many tributes to the great men and their achievements who during it have added to the intellectual and material "joy of life." But I felt that among the strains of joy with which we part from the old and enter on the new, one minor chord, however feeble, might not be amiss—"Lest we forget." When Pandora opened her fateful box one legend says that all the winged blessings flew away and only Hope was left. And though it would almost seem as if all the winged blessings of our art had vanished beyond the cloud that overhangs it as we pass from the old century to the new, yet Hope comes with us, and even as we look at the shadow it seems to lighten, and the winged blessings are seen hovering not far away; for we take with us this assurance from the old century to the new, that the former has shown us the means by which, if faithfully used, we may dissipate the clouds and render our art worthy of its high and beneficent purpose.

On the motion of *Dr Halliday Croom*, seconded by *Dr Berry Hart*, the President was accorded a hearty vote of thanks for his address.

V. EXTROVERSION OF THE BLADDER.

By Dr Berry Hart.

(This paper appears at the end of this volume of Transactions.)

VI. CLEIDOTOMY: AN OPERATION ACCESSORY TO CRANIOTOMY OR BASILYSIS.

By J. W. Ballantyne, M.D., F.R.C.P. Ed., Lecturer on Midwifery and Gynæcology in the Medical College for Women, and Assistant Physician to the Royal Maternity and Simpson Memorial Hospital, Edinburgh.

Abstract.

Cleidotomy: division of the clavicle; Schlüsselbeinschnitt.

Notes of case of labour in contracted pelvis, c.v. 7 cms.; basilysis; impaction of shoulders at brim; unilateral cleidotomy; immediate delivery.

Recommendation by Dr H. R. Spencer in 1895; cases of cleidotomy reported by Phänomenoff, Knorr, Strassmann, v. Herff, Guérard, Kallinowsky, and Bonnaire.

Allied operations of cleidotripsy, cleidorrhexis, and supra-acromiotomy.

Description of operation.

Indications:—

(1) Broad-shouldered fœtus.
    (*a*) Normal-sized head; (*b*) large head; (*c*) deformed head (anencephalus).
(2) Contracted pelvis.
    (*a*) Justo-minor; (*b*) flat-rachitic; (*c*) kyphotic.
(3) Broad-shouldered fœtus in contracted pelvis, neither excessive.
(4) Impacted shoulders in breech case.
(5) Danger from eclampsia, threatened uterine rupture, etc., necessitating rapid delivery.

In all (or nearly all) its indications cleidotomy is accessory

to craniotomy or basilysis, and is carried out upon the dead infant; but these are not essential restrictions.

Advantages over ordinary embryulcia of the shoulders and evisceration of the thorax.

Cleidotomy is not so much an operation by itself (although it is possible to imagine circumstances in which it might be performed independently of all other operations) as an operative manœuvre accessory to such procedures as craniotomy and basilysis. It is not likely that it will be very often indicated in these times when the current of obstetric opinion and practice is setting strongly against the operations which are destructive to the infant; but it is certain that now and again cases will arise in which it is difficult to imagine any other procedure which would meet their requirements. I have only used it in one case, to be now narrated, but in that case it was of immense assistance.

On 6th August of the present year (1900) I was sent for by Dr James Smith to a difficult confinement case. The patient was a primipara, 25 years of age, at the full term of pregnancy, and had been in labour since the small hours of the morning; it was now twelve noon. As a child she had suffered much from rickets, and had many signs of that disease, including evidently bent legs. About two hours before I was sent for the os had attained full dilatation (the membranes had ruptured early), and Dr Smith had with some difficulty applied forceps, but after repeated tractions had been quite unsuccessful in altering the level at which the fœtal head was lying, viz., above the inlet. I found that the conjugata vera measured three inches, or a little less (about 7 cms.), and that the head was lying at the brim in the transverse diameter, with the occiput to the left. It did not seem to me that the head was either very large or very well ossified. The sides of the pelvic brim and also the cavity and outlet felt narrow, and probably the pelvis was to some extent generally contracted, as well as flat. The infant was dead. I put on the forceps with some difficulty, getting an antero-posterior grasp of the head, but one or two attempts at extraction soon showed that nothing was to be expected from that method of interference. With-

out further delay, and with the forceps still applied to the head, I perforated the cranial vault with Simpson's basilyst, washed out the cranial contents and vagina with an antiseptic solution, and again tried to extract the child, first with the forceps and then with a Simpson cranioclast. It was, however, immediately necessary to break up the basis cranii, which I did with the basilyst, and thereafter I was able to bring the head on to the perineum and partly through the vulva. At this point I was again baffled, for no further progress could be obtained. I tried in vain to get first my finger and then a blunt hook into either the left or right axilla of the infant. The occiput was to the front of the mother and the right shoulder in the right side of the pelvic inlet; the patient was lying on her left side. I noticed in one of my many unsuccessful attempts to reach the axilla, that when I passed my finger up to the right side of the mother's pelvis I could feel the child's right clavicle quite distinctly; it struck me that if I could divide that bone the shoulders might diminish in their transverse diameter and then enter the pelvic inlet. I made the suggestion to Dr Smith, who agreed with me; and with a pair of long, strong scissors, which he happened to have with him, I cut through the right clavicle about the point of union of the inner third with the outer two-thirds. Almost immediately after this I found that I could now reach the infant's left axilla lying to the left side of the mother's pelvis. I passed the blunt hook into it, and without any great difficulty extracted the shoulders. The rest of the confinement did not cause any trouble, although even the child's hips required some firm traction to bring them through the brim. The placenta came away easily, and the perineum needed two stitches. The fœtus, a female, was of medium size, probably weighing about seven pounds; and the basilyst had done its work well both as regards vault and base. The right clavicle had been cleanly divided in the position above mentioned. A comparison of the two shoulders showed at once that the right one (with the divided clavicle) could be folded together in a much more marked way than the left; the total transverse diameter of the shoulders could thus be considerably diminished. Doubtless the diminution would have been more

marked had I divided also the left clavicle, which I was quite prepared to do had circumstances appeared to call for it. It need only be added that the mother made a capital recovery, and has been advised, if she again find herself pregnant, to consult her doctor before the seventh month of utero-gestation. Unfortunately, measurements of the infant, and especially of the shoulders, were not made at the time of the cleidotomy, and an opportunity of making them did not recur; but I should judge that the diminution in the bisacromial diameter by the unilateral cleidotomy would be about half an inch.

Doubtless obstetricians in past times, when in the presence of such an emergency as the impaction of the shoulders, after the birth of the head (either intact or craniotomised), pursued some plan of procedure for the reduction of the width of the shoulders such as has been described. They do not seem, however, to have specialised the procedure into a definite operation, nor to have localised the embryulcia to the clavicles. In these respects the contribution of Dr H. R. Spencer marks a new departure. Writing in the *British Medical Journal* for 13th April, 1895 (p. 808), under the title "On Delivery in Certain Cases of Impaction of the Trunk of the Fœtus," he says: "It may be necessary to reduce the width of the child's shoulders. With this object I have found it a useful plan to snip through the clavicles with scissors, then if necessary to pass a blunt hook into the axilla, and then to bring down the arms." He also states that he had met with several cases where craniotomy alone was not sufficient to extract; presumably, therefore, he practised this snipping through of the clavicles on several occasions. In a letter to me from Dr Spencer, received 12th November 1900, it is stated that he has up to the present time performed the operation in "about five or six cases; it is not often required, but is very useful." About six weeks later (1st June 1895) appeared a contribution from the pen of Prof. N. N. Phänomenoff of Kasan (Russia), entitled, "Zur Frage über Embryotomie. Über die Durchschneidung des Schlüsselbeins (Cleidotomia)." This was in the *Centralblatt für Gynäkologie*, xix., 585, 1 Juni 1895. The circumstances which led Phänomenoff to perform the operation of division of the clavicle

("Durchschneidung des Schlüsselbeins") were, briefly stated, disproportion between the fœtus and the pelvic canals due rather to great size of the former than to marked contraction of the latter, and more particularly to great size affecting specially the shoulders. The case, which he records in detail, was one in which the diagonal conjugate measured 11 cms., and the conjugata vera presumably just under 10 cms., (under four inches). The patient had had three previous confinements which had all been very markedly delayed (four days, two days), and had been terminated by forceps. In the present confinement (the fourth) the head was without much difficulty brought down with forceps on to the perineum, but then further progress stopped, and in the midst of a series of extractive procedures, none of which was successful, the fœtus died. Suspecting that he had to do with a case of great breadth of the fœtal shoulders, Phänomenoff passed a pair of strong scissors up above the brim of the pelvis, and cut through with some short snips ("durchschneidet mit einigen kurzen Schnitten") both clavicles near their inner end. Strong traction on the head now was sufficient to bring one of the axillæ within reach, and Braun's hook fixed therein completed the delivery of the body. The infant weighed thirteen pounds, or 5300 grms., and had a length of 61 cms.; the circumference of the shoulders was 41 cms. Phänomenoff adds that some years previously he had performed the same operation for a similar state of affairs. He strongly recommends the use of the name "cleidotomia."

On 22nd November 1895, Knorr showed to the Berlin Obstetrical Society an infant upon whom both craniotomy and cleidotomy had been performed (*Ztschr. f. Geburt. u. Gynäk.*, xxxiv., 105, 1896). The case was one of labour in a 44-year old parturient; she had been in charge of a midwife, and the uterus had evidently ruptured spontaneously before help was sent for to the Poliklinik. The patient was moribund, there having been much intraperitoneal hæmorrhage; the infant was presenting R. O. A.; without an anæsthetic craniotomy was performed, and the head without difficulty brought down with the cranioclast. Powerful traction for several minutes failed to deliver the trunk. The child's sternum was lying

opposite the promontory of the sacrum, so with Siebold's scissors both clavicles were divided without difficulty. The result was most astonishing ("der Effect war sehr eclatant")—a slight pull delivered the trunk. The patient died twenty minutes later. The infant was very large, measuring 57 cms. in length and weighing, without the brain, 4110 grms., and this fact, along with the degree of pendulous abdomen which was present, had no doubt something to do with the rupture of the uterus. The infant, it may be added, showed rigor mortis, which lasted twelve hours.

In the autumn of 1896, Strassmann (*Arch. f. Gynæk.*, liii., 135, 1897) published three cases of cleidotomy, or as he prefers to call it, "Schlüsselbeinschnitt." In two of these only one clavicle was divided, but in the third the operation had to be performed on both sides. In the first case there was threatened uterine rupture on account of disproportion between the fœtus and the maternal pelvis, and the vagina showed contraction in consequence of a previous operation for vesico-vaginal fistula. The fœtal head was perforated and easily brought down with the cranioclast, but the shoulders could not be extracted till the left (posterior) clavicle had been divided, then the delivery was easy. The child weighed 3700 grms., and measured 54 cms. in length. The circumference of the shoulders was 41 cms. The second case was one of a first labour in a generally contracted pelvis (woman's age, 32) with a conjugata vera of 9 cms. The child was already dead. The head was perforated, and after two attempts with the cranioclast and strong abdominal pressure, was brought to the vulva; but the shoulders could not be extracted till the right clavicle had been divided. The infant was large (exact weight not ascertained) and in a macerated condition. The third case was that of a 40-year old xiii.-para, who had been five times artificially delivered. In the present labour uterine rupture was threatened, the head was presenting and fixed at the brim, and the child was apparently dead. Version was not possible, so the head was perforated and brought down; but the shoulders remained high up and the arms could not be brought down for fear of rupturing the uterus, so bilateral cleidotomy was performed. Thereafter the birth was easily

completed. The child, a male, was large (weight 4200 grms., circumference of shoulders 41 cms.). On the left side the subclavian vessels were intact; on the right the vein was cut.

In the same journal (*Arch. f. Gynæk.*, liii., 542, 1897) in which Strassmann's article appeared, Prof. v. Herff described a somewhat similar procedure which he called "Zertrümmerung des Schulterngürtels" (destruction of the shoulder-girdle), and indeed regarded as synonymous with cleidotomy. He recorded a case operated upon in 1889: the infant was anencephalic, and the head had been extracted by forceps, but the broad shoulders could not be made to engage, so with Lévret's scissor-like perforator the upper pair of ribs along with one clavicle were broken up. The further delivery caused no trouble. In another case treated in 1896, in which the pelvis was flat-rachitic (c.v., 9 cms.), the head of the infant was easily brought down with forceps and abdominal pressure, but the shoulders became impacted; the posterior shoulder was treated in the same way (with the perforator) as in the case of the anencephalic, and then with the help of Guyon's hook the labour was quickly completed. The infant died during the confinement; it weighed 4000 grms., had a shoulder circumference of 40 cms. (head circumference 34 cms.), and a length of 52 cms. It is to be noted that v. Herff's procedure is, as Bonnaire maintains, rather a *cleidotripsy* than a *cleidotomy*, but the principle is the same, and the indications are not different.

A case reported by H. A. v. Guérard (*Centrlbl. f. Gynäk.*, xxii., 71, 1898) supplies still another indication for cleidotomy. It was that of a full-term labour in a kyphotic pelvis with a greatly contracted outlet and ankylosed sacroiliac joints. The head was broken up and extracted with the cranioclast, and then after cleidotomy had been performed and the coccyx had fractured, the whole child was born. The distance between the tubera ischii was only 5·2 cms. In the same year (1898) G. Kallinowsky of Thorn published an *inaugural dissertation* of Berlin "Uber Kleidotomie." Of this work I have seen only the abstract in the *Centralblatt für Gynäkologie* (xxii., 1011, 1898), and do not know whether any new case is described in it, unless that referred to as by Wolff is such.

In March of the present year (1900) E. Bonnaire's article, "De la réduction du volume des épaules dans l'accouchement dystocique," appeared (*Presse médicale*, No. 21, p. 125, 14 Mars 1900). In it he described various forms of dystocia connected with the birth of the shoulders, referring to several procedures commonly employed in order to overcome the difficulty, such as bringing the bisacromial diameter into the long diameter at brim or outlet, bringing down the posterior arm below the promontory of the sacrum (Jacquemier's manœuvre), bruising or breaking the shoulder girdle (*kleidorrhexis*) of set purpose, as carried out by A. Müller (*Monatsschr. f. Geburtsh. u. Gynæk.*, viii., 477, 1898), etc., and then passed to the consideration of cleidotomy in particular. He gave details of two cases in which this operation was practised by him. In one there was a justo-minor pelvis (c.d. = 11 cms.) with rigidity of the soft parts in a primipara; the labour was long; unsuccessful attempts to deliver with forceps were made; the infant died; basiotripsy was then performed; and finally in order to extract the trunk bilateral cleidotomy was carried out with sharp scissors. In the second case there was also a justo-minor pelvis (c.d. = 9 cms.) in a primipara: premature labour was induced with Tarnier's dilator and an intra-cervical glycerine plug; dilation, however, was incomplete and had to be supplemented manually; the infant died, and then the head was perforated, the cranioclast applied, both clavicles divided, and the child at length delivered. From five experiments upon dead-born infants Bonnaire found that cleidotomy diminished the bisacromial circumference by from 1 to 3 cms. in the unilateral, and from 3 to 4 cms. in the bilateral operation. Bonnaire also described an operative procedure which he had adopted when it was impossible to reach the clavicles to divide them. This he called *supra-acromiotomy*, and pointed out that it was a localised embryotomy in which the skin and muscles covering the projection of the shoulder were divided widely and deeply. He reported two cases in which supra-acromiotomy had been performed: one as an accessory to basiotripsy upon a dead infant in a justo-minor pelvis with a c.v. of 8½ cms.; the other as an accessory to cranioclasm upon a dead infant in a case of eclampsia where forced delivery had been necessary.

In both these instances cleidotomy was attempted, but found impossible of performance; in the latter case the patient died, a result for which the eclampsia was no doubt to blame.

Let us now gather together some conclusions from the records which have thus far been accumulated referring to cleidotomy and the allied procedures of cleidotripsy, cleidorrhexis, and supra-acromiotomy. *Cleidotripsy* may be dismissed at once, for manifestly to break up the clavicle with a perforator cannot be either so elegant or so satisfactory an operation as to divide it with a pair of scissors. *Cleidorrhexis* also cannot be recommended, as in it the force is applied to the shoulders (it is used in breech cases when the most of the trunk has been born) in a way difficult to regulate and uncertain in its action. *Supra-acromiotomy* is only to be employed when cleidotomy is impossible on account of inaccessibility of the clavicles; it is not so exact or useful, although it may be of great value in a limited number of grave cases such as eclampsias. Practically, therefore, cleidotomy stands out as the best operation for comminuting the shoulders and diminishing the bisacromial circumference.

It is an operation not difficult of performance. The only instrument needed is a pair of long, strong, straight scissors. The index and middle fingers of the left hand are passed up along the anterior aspect of the infant (whose head or breech has already been born) until the prominent ridge of the clavicle of one side is felt, and it can be felt very easily; then the scissors held in the right hand is pushed up under cover of the two fingers of the left hand until it touch the clavicle at a point about its middle or near its sternal end; the blades are then slightly separated and the bone with the skin covering it is snipped through and the scissors withdrawn, or the operation repeated upon the other clavicle if need be; the two parts of the clavicle will be felt to over-ride at once if the section has been complete. There is really no danger of wounding the mother's parts, and results have shown that even the subclavian vessels, and especially the vein, of the infant need not be injured if reasonable care be taken. A dead infant, I found, had a bisacromial circumference of 27 cms., with the shoulders compacted on the chest 25 cms., with one clavicle

divided 23 cms., and with both clavicles divided 22 cms. These measurements show a diminution of the bisacromial circumference of 2 and 3 cms. in unilateral and bilateral cleidotomy respectively.

As to the *indications* for the operation, obstetrical opinion can hardly be said to have crystallised. Cleidotomy has not yet, I believe, been performed upon the living infant. In the recorded cases the child was dead, therefore out of court, so to say, but not, unfortunately for the mother, out of the uterus. There seems, however, no real reason why under certain rarely occurring circumstances cleidotomy should not be performed upon the living fœtus. Fractures of the clavicle are met with as a result of labour or of obstetric interferences, and with care these heal quickly and thoroughly; in cleidotomy the same thing may quite well be expected to happen if the skin wound be kept aseptic. The great indication, of course, is disproportion between the size of the shoulders and the pelvic canals. There may be, therefore, (1) the broad-shouldered fœtus with (*a*) a normal sized head, (*b*) a large head, and (*c*) a deformed head, as seen typically in the anencephalic; in the first and third of these cases cleidotomy may be the only operation, in the second it will be accessory to craniotomy or basilysis. Some years ago I showed to this Society (*Trans.*, xviii. 225, 1893) a large still-born fœtus with a bisacromial circumference of 43·5 cms.; in this case I believe the operation would have been justifiable either before or after the infant's death. In the case of the anencephalic infant the indication is absolutely clear, for the small head is usually born as far as the vulva easily, while the broad shoulders give much trouble in passing through canals imperfectly dilated by the head. There may be (2) the normal sized fœtus in the contracted pelvis, specially in (*a*) the justo-minor, but also in (*b*) the flat and sometimes in (*c*) the kyphotic. In the first and second cases the cleidotomy will be needed at the brim in most instances while in the third it will most probably be required at the outlet; and in all the three it will doubtless be preceded by craniotomy or basilysis. There may be (3) the fairly broad-shouldered fœtus in the moderately contracted pelvis. In this group of cases cleidotomy would not be needed either for the

fœtal condition alone or for the maternal alone, but for the difficulty which arises from the combination of both in the one case. In all these indications it has been supposed that the infant has presented by the head; but (4) it may present by the breech and then cleidotomy may in some few cases be also advisable, although the necessity is not so great or the good effect so obvious. Finally (5) there may be cases in which, although there may be no special disproportion between the shoulders of the infant and the mother's canals, hard or soft, yet on account of pressing danger from eclampsia, threatened uterine rupture, etc., it is essential that the labour be rapidly completed. Here also the cleidotomy will probably follow a craniotomy or a basilysis.

Cleidotomy, then, must take its place among the legitimate obstetric operations; legitimate, at any rate, when the fœtus is dead, possibly permissible even when it is alive, if it can be shown not to endanger seriously its chances of living. If it be asked what obstetric procedure it displaces, the answer is that it takes the place of indiscriminate and unregulated embryulcia of the shoulders and thorax. It is simpler, more rapid, much more elegant, and equally if not more effective. The cause of delay is the width of the shoulders in the bisacromial diameter; by cleidotomy this diameter is immediately diminished. So the end is achieved in the quickest and most straightforward, and therefore (theoretically, at least) the best, way.

The President had listened with much interest to Dr Ballantyne's paper. He felt sure that the procedure of cleidotomy was one which in certain cases would be employed with great advantage to the mother, and would greatly reduce the danger to her in delivering a bulky body after a destructive operation on the head; and this in itself was a great gain. He recalled a case which he had long ago reported to the Society, where he had no doubt such an operation would have saved the patient much risk, and himself much anxiety. The case was one of a face presentation, when after delivery of the head nearly an hour was spent in attempts at delivery of the shoulder, the difficulty arising from the arms being extended down the back. He was quite sure that division of one or both clavicles

would have permitted of sufficient compression and moulding of the shoulders to have allowed the body to escape with a tithe of the efforts and consequent danger to the mother, which were actually involved.

Drs Haultain, Ferguson, and *Fordyce* also made remarks.

Dr Ballantyne replied.

MEETING II.—12TH DECEMBER 1900.

DR MILNE MURRAY, *President, in the Chair.*

I. The following gentlemen were elected Ordinary Fellows of the Society:—George Mackie, M.B., Ch.B., Convalescent House, Corstorphine; Kenmure Melville, M.B., Ch.B., 15 Braidburn Crescent, Edinburgh; J. T. Dickie, F.R.C.P. & S.E., 37 Lauriston Place, Edinburgh; W. E. Frost, M.B., Ch.B., Royal Maternity Hospital, Edinburgh; F. D. Simpson, M.B., Ch.B., Royal Maternity Hospital, Edinburgh; Francis W. Harlin, F.R.C.P. & S.E., Leith Hospital; William Darling, M.A., M.B., Ch.B., Leith Hospital; Robert M. Mitchell, M.B., Ch.B., 2 Gloucester Place, Edinburgh; Malcolm Campbell, M.B., Ch.B., Royal Infirmary, Edinburgh.

II. *Dr Milne Murray* showed—(*a*) A DERMOID OVARIAN TUMOUR, AND OVARY WITH RECENT CORPUS LUTEUM. I first saw the patient from whom this specimen was obtained about five years ago. At this time she was three months pregnant, and a tumour could be felt behind and apparently connected to the uterus, which at that time I concluded was a subserous fibroid. The pregnancy was uneventful and the labour easy, the child presenting by the breech. Ten days after her confinement she had a smart attack of influenza, and a week later I was sent for in a hurry as she had suddenly developed pain in the right side with some rise of temperature. On examination there was much tenderness, and a diffuse tender but apparently immobile mass could be made out through the right fornix, which I thought must be a cellulitic deposit. The general sensativity was too great to enable me to palpate the uterus. Some six months afterwards the lateral fornix had cleared up, and the old tumour could be

felt much in its former place. I saw the patient from time to time and noticed no change, until in June this year I found that the tumour had increased in size and was now evidently cystic. It had become distinctly detached from the uterus, and was now rather above or in front of it, and there was now no doubt that it was an ovarian cystoma. Circumstances prevented the operation being undertaken until August, when with Dr Haultain's assistance I opened the abdomen, and found this dermoid tumour. The operation was a little complicated, for on attempting to evacuate it with the trocar we found that it refused to drain, partly because of the consistence of the contents, but also because the trocar became hopelessly plugged with tufts of long black hair. On raising the tumour we found that the pedicle was quite thin and twisted two or three times in itself, while the anterior aspect of the tumour was attached by a dense membranous adhesion about three inches broad to the fundus of the bladder. The pedicle was tied and divided, and the adhesion dealt with afterwards. The other ovary was very much enlarged, and it was removed as well. We noticed that the uterus was somewhat enlarged, and both it and the limbs were much congested, and the possibility of pregnancy was suggested at the time. On opening the second ovary a recent corpus luteum was disclosed. Three days after a profuse vaginal hæmorrhage occurred, and continued for nearly a week. At times it was alarmingly copious, but nothing like an ovum was obtained in the discharge. A week after, however, the breasts gave a copious secretion of rich milk, which continued in diminishing amount for a month.

The special interest of this case (apart from the error in diagnosis) lies in the fact that after twisting of the pedicle the tumour became adherent to the bladder. Looking back on the case my impression is that what I mistook for a cellulitic after her confinement was really the result of a twisting process then, and that further twisting had been rendered impossible by the adhesion to the bladder which followed.

(*b*) A MYOMA of rapid growths removed by abdominal hysterectomy. The patient, single, aged 47, menstruated last in February 1900. On Easter Sunday she returned from church, and found she could not pass water. Her doctor passed a

catheter and found a retroverted uterus, with a tumour about the size of a hen's egg attached to the posterior wall. The uterus was easily pushed up. I saw her on 19th August. Tumour was suspiciously soft and baggy, rather smaller than a fist, and upper part at level of brim. On 25th September it was distinctly larger, filling all the right side of the pelvis, and much less movable than formerly. The operation was performed on the 18th October, when the wall was found to be well into the abdomen.

My reasons for operating were, first, the rapid growth of the tumour after the menopause, and also the fact that several near relatives of the patient (including her mother) had died of sarcoma. The tumour is a typical myoma.

III. *Dr Brewis* showed—(*a*) FIBROCYSTIC TUMOUR of the right broad ligament, and a FIBROMYOMA of the uterus removed along with the uterus by abdominal section from the same patient.

Mrs L., æt. 47, nonipara, came under my care on 15th September 1900, complaining of enlargement of the abdomen. She first noticed a fulness in her right side three years ago, and ever since has felt uncomfortable on exertion or after taking food. There has been no pain. Menstruation has been absent for ten months. She has experienced no urinary trouble except last summer when, for a few days, she had some difficulty in micturating. She suffers from profuse perspirations. There has been a slight loss of flesh. She has complained of a numbness down the front of the right thigh.

Physical Examination.—The abdomen contains two swellings—one cystic, the other solid. The former extends from a point 2 inches above the umbilicus down to the vaginal orifice; it is very slightly movable, and fluctuation is distinctly felt throughout. Above and to the left of this tumour the other swelling is situated; it is hard, movable, and about the size of a man's fist. Per vaginam, the cystic tumour bulges forward the whole of the posterior vaginal wall. The vaginal portion of the cervix can with difficulty be recognised above and to the left of the symptysis pubis.

Operation.—19th September 1900. Abdominal section. Patient in Trendelenberg position. On opening the abdomen

the uterus was found displaced into the left lumbar region and the hard swelling mentioned above was demonstrated to be a fibroid growing from the fundus. The bladder was high placed. On the right side the tumour was situated between the layers of the broad ligament and descended down at the side and behind the uterus to within an inch of the vaginal orifice. The ovary was placed on the top, and the round ligament coursed over the front of the tumour. Aspiration got about a pint of slightly bloodstained fluid which coagulated on standing into a yellow and red jelly. The left broad ligament and left ovary were tied off, and the uterus and fibroid attached to it removed. The right uterine and ovarian vessels were next secured, after which the right broad ligament was opened and the tumour shelled out. The vaginal roof was then opened, gauze was stuffed into the cavity left by the removal of the tumour, and brought through with the vagina. A considerable portion of surplus broad ligament was then cut away, and the anterior layer united to the posterior by catgut stitches. Catgut was used throughout the operation. The patient recovered without an anxious symptom.

Naked-Eye Appearance of Tumour.—The tumour presents the shape of a flattened sphere. It measures 6 in. by 6½ in. from side to side and from top to bottom. It is 2½ inches in depth. The anterior surface is rough, and distributed over it are several fibrous trabeculæ. Its posterior surface is smooth and glistening, being covered by an unbroken capsule. Its consistence is firm and doughy. On section the cut surface has the appearance of a fibromyoma. Under the capsule, chiefly at its upper and lower borders, softening and hæmorrhage have taken place. The round ligament is much increased in size and appears to be changed into fibromyomatous tissue. The tube and ovary appear healthy. The uterus had a fibromyomatous tumour, measuring nine inches in circumference growing from the fundus.

Microscopic Examination of Broad Ligament Tumour, by Dr Shennan.—"It presents the characters of a fibromyoma. In some parts the tissue becomes looser, resembling myxomatous tissue, and the majority of the cells here are either rounded, oval, or spindle-shaped, separated by spaces containing fluid

and delicate fibrillæ. The bloodvessels are embryonic, and there are minute hæmorrhages into the tissues."

(*b*) UTERUS removed by vaginal hysterectomy for cancer of the body.

Mrs S., æt. 53, nonipara, married for twenty-seven years, came under Dr Brewis's care complaining of constant bleeding. In February 1899, after complete cessation of menstruation for three years, the patient noticed a little blood come from the vagina. This gradually increased in quantity. Three months before admission very severe pain was complained of in the lower abdomen. After the pain disappeared profuse bleeding took place, and lasted for three days. As the bleeding continued she consulted Dr Joseph Bell, who advised her to see Dr Brewis. Bimanual examination revealed no sign of malignant disease; the cervical mucous membrane was perfectly healthy, but as the body was enlarged, curettage was performed, and the scrapings were reported by Dr Gulland to exhibit the characters of early primary cancer of the uterus. Dr Brewis therefore removed the uterus along with the uterine appendages. The vagina was narrow and senile, and to gain room the perineum was incised. The patient recovered easily. The uterus measured 3½ inches in length, and on section the anterior wall was found to be ¾ inch in thickness. The endometrium was thickened and reddened, and in the region of the left tubal opening the disease was found to extend for about ¼ of an inch into the muscle. The cervical mucosa appeared perfectly healthy, the arbor vitæ being well seen.

(*c*) MYOMA OF THE OVARY. The ovaries removed in the above case were both senile, but growing from the right was a hard round tumour about the size of a hazel-nut, which, on microscopic examination, was found to be a myoma.

(*d*) UTERUS WITH APPENDAGES removed by abdominal section for ovarian abscess and pyosalpinx. Dr Brewis showed the above specimens to illustrate the mischief which a miscarriage may bring about. The patient was 29 years of age, and her illness dated from a miscarriage three years ago, since which time she had been in constant pain. On examination a large rounded fixed swelling was found in the right side of the pelvis, displacing the uterus to the left. On 6th

October the abdomen was opened, when the swelling on the right side was discovered to be the ovary enlarged to the size of a fœtal head, with the tube much swollen and reddened lying over it. The uterus lay to the left and front, and was distinctly enlarged. The left ovary and tube were enlarged and matted together, forming a rounded mass of considerable size. All the organs were fixed by strong adhesions. The right ovary was first liberated from its bed, and in doing so it ruptured, and about a pint of pus poured out. The ovarian and uterine vessels on that side having been secured, and bladder pushed down, the cervix was divided, followed by ligature of the left ovarian and uterine vessels, and removal of tube and ovary on the left side. The pelvis was then thoroughly irrigated through an opening made in the vaginal roof, after which the pelvis was packed with gauze, the free end of which was drawn down into the vagina. The cervical stump was then covered over with peritoneum and the abdomen closed. The patient's recovery was uninterrupted.

Naked-Eye Appearance of Parts Removed.—The right tube is much enlarged, irregularly convoluted, firm in consistence and deeply injected. The fimbriæ cannot be recognised. The orifice is patent, and in section the walls are thickened and the interior contains a granular purulent material. The right ovary is greatly enlarged and irregular in shape, is firm and fibrous in consistence, and when opened presents one large cavity with rough walls from which pus escaped at the operation. The broad ligament is thickened and fibrous. The left ovary and tube are incorporated, forming a pear-shaped mass. The tube is spread out over the upper aspect of the ovary, and is adherent to it; the ovary is as large as a hen's egg and contains a large hæmatoma.

(*e*) LARGE FIBROID TUMOUR of the uterus removed by subperitoneal hysterectomy. Dr Brewis showed the above specimen to demonstrate the ease with which a fibroid tumour tightly wedged in the pelvis could be removed by enucleation. The tumour was a rapidly growing one, and was removed on account of urgent pressure symptoms.

Omphalopagous Twin Monster.

[*To face page* 41.

IV. *Dr Haultain* showed—(*a*) An OMPHALOPAGOUS TWIN MONSTER, which weighed over 15 lbs. It was delivered by Dr Cairns, Northampton, from a multipara. The presentation was podalic. The confinement was very difficult, but the mother progressed favourably. (*b*) A LARGE FIBROMYOMA of the uterus removed by pan-hysterectomy, as a large mass of the tumour projected through the cervix, and thus contraindicated the supra-cervical method of amputation. (*c*) A UTERUS from a patient, age 29, with advanced cancer of cervix and vaginal roof. The history of the patient was very interesting in so far as she never menstruated before marriage, at the age of 24. Then she had but one period before she became pregnant, and was delivered of a seven months child, which was posthumous. She never menstruated again. Dr Haultain was asked to see her in consultation with Dr Cattanach, on account of pelvic pain. The morning of the consultation vaginal bleeding commenced, and it was postponed. As bleeding continued for a fortnight it was decided to examine in spite of the discharge, when the malignant condition was found. The body of the uterus is extremely small, admitting the sound one and a half inches.

(*d*) AN ECTOPIC PREGNANCY of three months. Two weeks after the first period missed the patient suffered from severe abdominal pain and symptoms of obstruction of the bowels. These were successfully treated; but four weeks after this there was a profuse uterine hæmorrhage, with expulsion of portions of decidual tissue which were mistaken for a simple abortion. Twelve days after this the patient was again seized with abdominal pain of an aggravated character, at which time I first saw her and recommended operation. On opening the abdomen a small quantity of fairly recent blood was found in the peritoneal cavity, a ruptured left broad ligament with entire ovum *in situ* was then removed. While deep in the retro-uterine pouch, shut off by matted intestines from the general peritoneal cavity, was an old hæmatocele, the probable cause of the early symptoms of pain and obstruction.

V. *Dr Scott Macgregor* showed a UTERUS removed by vaginal hysterectomy for early cancer of the cervix.

VI. *Dr G. T. Barbour Simpson* showed a PESSARY which had been retained in the vagina for twenty-five years.

VII. *Professor Simpson* showed an EXAMPLE OF INTRA-PERITONEAL RUPTURE OF AN OVARIAN CYST.

VIII.—SPOON-SHAPED INDENTATIONS IN THE SKULLS OF THE NEW-BORN, WITH ILLUSTRATIVE CASES, AND A NEW METHOD OF TREATMENT FOR THE IMMEDIATE RELIEF OF THE DEFORMITY.

By J. M. MUNRO KERR, M.B., C.M., F.F.P.S.G., Assistant to the Chair of Midwifery, Glasgow University; Assistant Physician, Maternity Hospital; Dispensary Physician for Diseases of Women, Western Infirmary.

MR PRESIDENT AND FELLOWS,—The subject of indentations in the skulls of the new-born is *not* one to which very careful attention has been paid in this country. Odd cases doubtless have, from time to time, been reported in the various journals and text-books on midwifery, but as far as I can discover no one has considered the subject in detail. In Germany the case is only a little better. In France, however, it is very different. Ever since Ambrose Parè first referred to the deformity, successive generations of obstetricians have interested themselves in the matter, and even in recent times hardly a year passes without one or more treatises or papers on the subject appearing.

Indentations of the fœtal skull may be either spoon or furrow shaped. The two varieties occur with about equal frequency. They, however, have not the same significance, for although the conditions producing them are in the main the same, the furrow-shaped variety is much less serious, and seldom gives rise to much immediate trouble. My purpose, therefore, at present is to consider exclusively the spoon-shaped indentations.

The injury, which is situated usually on one or other parietal or frontal bones in the neighbourhood of the anterior fontanelle, is by no means uncommon, especially in the city of

Glasgow, where rickets is so prevalent amongst the lower classes, and parturition is in consequence so frequently laborious. This leads me to say that the accident, with few exceptions, occurs where there is a deformity of the maternal pelvis, and as rickets is the most common cause of such, we meet with the injury generally in the offspring of women with flat rachitic pelves. The extent of the pelvic deformity need not be extreme; most commonly it is just sufficient to cause a moderate degree of obstruction to the passage of the head. That was so in three of the four cases I have seen, and, in the recently reported cases by Hinck, Drittel, Braune, Boissard, Budin, etc.

In the great majority of the cases reported extraction was completed by traction, either on the child's head with forceps, or on the trunk if the presentation was a breech or the child had been "turned." Still in a certain small proportion labour terminated spontaneously. Braune's two cases and one of Hinck's already quoted were examples of this. Rosenski, in forty-three cases collected by him, found spontaneous birth took place in two cases, and Menke in fourteen cases found it twice. In all these cases of spontaneous birth there was a moderate degree of pelvic deformity.

Where a deformity of the pelvis exists the indentation is usually caused by the head being pressed against the projecting sacral promontory. Occasionally, however, the anterior pelvic wall, an undue prominence of the ileo-pectineal eminence, and still more rarely an osseous tumour of the bony canal, as in the case of Hoffmann, quoted by Lelièvre, may be the cause.

On the maternal side apart from deformities of the bony pelvis, there are very few conditions that have given rise to depressions of the fœtal skull. Veit reported a case in a normal pelvis, where he attributed the cause to tetanic contractions of the uterus, following the administration of ergot. Others have mentioned as causes lateral deviation of the uterus, contractions of the muscles of the pelvic floor, ankylosis of the coccyx, tumours of the soft parts, etc.

Although abnormalities connected with the fœtus but rarely cause such depressions as we are discussing, they may to some

extent favour their occurrence. Defective ossification of the fœtal skull, for example, is a condition that certainly predisposes to the accident.

Recently, I made a few simple experiments on the skulls of still-born infants. I found that I could produce depressions with the very greatest ease and with little pressure in some cases, but in others I could make no impression on the bones at all, even although I used considerable force. In one living child, also, which I remember very well, as it had a malformation of both its arms, owing to an arrest in their development, with the slightest pressure of the finger an indentation could be produced, so soft was the skull.

Lelièvre in his Thesis quotes a most interesting case described by Budin, where in a case of twins both the children were born with depressions on their skulls. The "aftercoming" head of the first child, which presented by the breech, was arrested by the presenting head of the second. Both children were born dead.

A prolapsed upper limb, by narrowing the pelvis, may produce a depression. Braune, for example, attributes that as the cause in one of his cases.

The exact part played by forceps in the production of the deformity is difficult to decide. That certain furrow-shaped depressions may be caused by it is certain, for I have once or twice produced them on the sides of the head when I have taken an oblique grasp of the head, but that spoon-shaped depressions, which almost always occur in the upper part of the vault, are often caused by the blades of the instrument is very doubtful. Occasionally, if the grasp of the head is very oblique and the hold is not very fast, one blade may directly cause the indentation. In the majority of cases of forceps delivery, however, it is pressure of the head against the promontory of the sacrum or some part of the pelvic wall, not the blades, that are to blame.

In this connection let me mention a case, which I will refer to more particularly later, where the deformity was produced in delivering with forceps a full time child from a normal pelvis. The case was a "persistent occipito posterior" (3rd vertex presentation), and I came to the conclusion at the time that the

depression over the right frontal bone resulted from pressure against the descending ramus of the pubis of the left side.

In delivering the head lying in a "persistent occipito posterior" position the two frontal bones are pressed against the anterior wall of the pelvis, while the occiput is being swept over the perineum. The blades of the forceps cannot be the cause because they would have slipped off the head before their tips could press on the upper part of the frontal bones, besides in practice, when the forceps slip, as they so often tend to do in occipito posterior cases, they do so over the occipital, not the frontal part of the head.

Most writers are now agreed that forceps have directly very little to do with the production of depressions. Of recent writers, Boissard thinks it is only when attempts at rotation are made that the instrument can cause them.

Occasionally two depressions may be found in the same skull, then the one is usually smaller than the other and placed opposite to it.

One or two writers have mentioned the recurrence of the accident. Thus Ahlfeld mentions a patient who had three children, and Strussmann the other day, one who had five born with depressions of their skulls.

Prognosis.

Having given the foregoing brief sketch of the causation of the accident, let me now refer shortly to the prognosis. Speaking generally the prognosis is not unfavourable.

If the children are born alive the indentations in the majority of cases disappear in a week or two, having given rise to no trouble at the time, and producing no ill effects later.

In a certain number, however, the depressions remain, and are a permanent deformity. In such cases there are usually no disturbances, although occasionally there may be minor nervous storms.

In yet another class of cases, although the child lives for days, weeks, or months even, there are very marked local and general disturbances. Such cases usually terminate fatally. The symptoms in these vary. In some there are nervous phenomena, such as twitchings, convulsions, paralysis, etc.,

when there is no difficulty in attributing them to the depression. In other cases, however, the nervous symptoms are absent, or only appear towards the end, there being nothing present but such general evidences of disturbances as fretfulness, disinclination to take the breast, etc. About three years ago, I had such a case under my care in connection with the work of the West-End Branch of the Maternity Hospital. The child, which was mature, was extracted with forceps through a slightly flat rachitic pelvis. It had a spoon-shaped depression over the right frontal bone, but otherwise seemed well, so I did not consider it necessary to operate. The child did not thrive, however. It did not take nourishment quite satisfactorily. Still I could not satisfy myself that this was due to the depression which remained unaltered. One day, some weeks after the birth, it took a few convulsive seizures and died. For a day or two before its death I seriously thought of operating, and I have regretted ever since not having done so. Boissard reports a case very similar as regards the absence of nervous symptoms. Death occurred on the fourth day, however, in his case.

But there is yet another group of cases where the child is born dead, or so deeply asphyxiated that if the indentation is not immediately relieved, death will certainly result. I saw a case of this kind some four years ago with a fellow practitioner. The mother was markedly rachitic, the c.v. was about 3¼ inches.

Great difficulty was experienced in extracting the "after-coming" head. When the child was born it was found to have a deep spoon-shaped depression of the parietal bone. The heart was beating very feebly. We could not resuscitate the child. I remember wondering afterwards if relief of the depression would not have given the child some chance of recovering. However, let me just say that when the injury occurs to the "after-coming" head it is a much more serious matter than if it happens to the "forecoming," because in dragging the former through, injuries to the parts about the medulla are so liable to occur that in cases of depression it may often be difficult to say how far the serious symptoms are the result of the depression, and how far of the injury to the spinal cord. Besides, the death may be due to long-continued pressure on the cord.

To give some idea of the seriousness of the accident let me mention the following figures.

Ahlfeld mentions ten cases with two deaths. Schroeder found in sixty-five cases 34% of the children still born, 15% died from the injury, and 50% remained alive, and as far as could be learnt, with few exceptions, were well. Menhe reports fourteen cases with three deaths. I have seen five cases; three are still alive and well. One died at the time of birth, and another some weeks after delivery.

Into the relationship between injuries to the skull and brain sustained during labour, and certain diseases of the nervous system, it is, of course, impossible to enter. As every one knows, a very distinct connection can not infrequently be traced between the two.

Treatment.

For the immediate relief of depressions of the fœtal skull many devices have been tried, thus such things as exhaust pumps and cupping glasses have been advocated. Koeberlé—and others have followed his suggestion, or varied it slightly—recommended the application over the depression of a piece of leather previously smeared with some very adhesive substance. To the centre of this a cord was attached by which traction could be exerted. None of these devices have proved at all successful.

In recent years, however, several cases have been recorded where operations have been undertaken for the removal of the deformity. Jennings,[1] for example, trephined the skull and elevated the depression successfully in a case where the left frontal bone was indented. In that case there was no great urgency, the operation was performed because twenty-eight hours after delivery there was no improvement in the condition.

In a certain number of cases the life of the child has been saved by timely operative interference. Boissard has reported a most interesting case. A full-time child was delivered with forceps. The presentation was a persistent occipito posterior. On the left frontal bone a large spoon-shaped depression existed. There was also exophthalmos of left eye. The child seemed in

[1] This case was brought under the notice of this Society three years ago by Dr Ballantyne.

a hopeless condition, as only once or twice there was a feeble heart beat. The depression was raised by making an incision through the scalp over the coronal suture, and a smaller one through the suture, passing a sound under the skull between it and the dura mater, and pressing out the depressed bone. The indentation, it is stated, was relieved by a force, "très peu considerable." Immediately the child began to breathe and rapidly recovered.

Panzani reports one of Secheyron's cases, where the child was delivered with forceps, the presentation being a persistent occipito posterior. The left parietal bone was depressed in the neighbourhood of its anterior superior angle. At birth the child seemed well. Two days later, however, it developed convulsive movements of the right arm, and it seemed generally feeble. On the day following, as the child seemed no better, an operation was decided on. An incision was made through the scalp, then through the bone, and the depression was raised by passing an ear curette along between dura and skull. On the second attempt the depression was relieved "brusquement." The child immediately after the operation took the breast greedily, and cried lustily. "On voit nettement que l'amelioration immédiate est évidente."

The oldest reference to operative interference in depression in the newborn is, as far as I can find, a case reported by Tapret in 1877. Boissard gives the case in detail. There was a great depression, with fracture of the left parietal bone, with left exophthalmos and right facial paralysis. The child cried very feebly. M. Millard bored through the skull with a tunel and raised the depressed bone, with the result that the child immediately cried, the convulsions ceased, the exophthalmos gradually disappeared, and on the following day only a trace of facial paralysis remained.

Up to the present time depressions of the skull in the newborn have been severely left alone, except in a few recent cases such as I have described.

The disadvantages of surgical interference when it must be immediate are that it takes time to prepare the field of operation, and that frequently the obstetrician has not suitable instruments to hand, and so valuable moments are lost. The method

employed by Boissard, as described, is very simple, and the operation requires very few instruments. It is certainly the operation I would be inclined to adopt if the following treatment, which has proved successful in three cases, failed.

A New Treatment.

The bones of the vault of the fœtal skull are very resilient, consequently a very little force applied to the depression from the inside is all that is necessary to relieve the indentation. If proof of this is required I would refer you to the two cases of Boissard and Sechreyron already briefly described, where in the former the force required to relieve the depression was "très peu considerable," and where in the latter the bone is said to have returned to its natural shape "brusquement."

The force must be applied early, otherwise there may occasionally be a little difficulty in raising the bones, as in a case reported by Prudhomme in his thesis published the other day, where a depression of the left parietal bone caused convulsions and death of the child on the third day, and where at the autopsy firm pressure on the depression from the inside was necessary to remove the indentation.

Indeed it was knowing this resiliency of the bones, but not being able to apply a force to the inside, that led some of the older writers to recommend cupping-glasses, air-pumps, etc.

Let me now relate a case and the treatment adopted.

About three years ago I attended a lady in her first confinement. Everything went on satisfactorily, except that the head took up and maintained an occipito posterior position. As the second stage was being unduly prolonged, I applied forceps, the head being at the outlet. With a moderate degree of traction I delivered her. The child, a female, was of average size and mature. It was slightly asphyxiated, and had, very much to my surprise, a deep, spoon-shaped depression of its right frontal bone. With a little cold water and slapping, etc., the child cried, and indeed I could not say that it was much affected by the deformity.

While looking at the indentation it occurred to me that by firmly compressing the head antero-posteriorly sufficient pressure might be exerted on the depressed bone to cause it to

spring out. I hardly expected the simple manœuvre to be so successful, for on the first attempt the depression came out, producing a sound as when a dent in a felt hat is removed.

After this success I tried the effect of compressions on artificially produced depressions in still-born children. Sometimes, as I have said, I have been unable to produce such depressions, but in all when I have found it possible the indentations have been relieved by antero-posterior compression, indentations of the parietal bones especially coming out with great ease.

Since the one described I have seen no case of indentation of the skull, so I have had no further opportunity of trying the treatment. I am able, however, through the kindness of Dr Malcolm Black, Physician to the Maternity Hospital, and Dr Dunning (I asked the former to be good enough to try the treatment if a case occurred in his practice) to report a second successful case.

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Mrs X., a iii.-para, had been previously delivered of two dead children, the first after craniotomy, and the second after induction and craniotomy. At the third confinement a month or two ago, Dr Dunning, who was in attendance, called Dr Malcolm Black in consultation, and the latter delivered by traction the child, which presented by the breech. The extraction of the after-coming head was attended with great difficulty as the pelvis was very much deformed. The child's heart was beating very feebly. Over the left frontal bone there was a large deep spoon-shaped depression. Artificial respiration brought about little improvement in the child's condition. Recollecting my request he tried compression, with the result that the indentation came suddenly out with a jerk. The child immediately after began to make attempts at respiration, and the heart commenced to beat more strongly; indeed, before long it was quite out of danger.

How far this simple method of treatment may prove successful I cannot say, as the cases described are the only two living children in whom it has been tried. I am hopeful, however, that in most cases it will be successful, because, as Milne Murray and Budin have pointed out, compression of the skull in an antero-posterior direction brings about an elongation of

the vertical diameter of the head, and indentations are almost always situated in the parietal or frontal bones.

Where the treatment may fail is, I fancy, in cases where dentations are situated low down on the sides of the head, or where too long a time has elapsed since the occurrence of the deformity.

On looking over the literature on the subject, I can find no reference to the treatment suggested.

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Postscript.

Since writing the above I have treated another case successfully.

A few days ago the House Surgeon in the Maternity Hospital asked me to come along and see an infant which had just been born and had a large spoon-shaped depression of its left frontal bone.

The following is a brief summary of the labours, as given me by the House Surgeon.

Mrs X., aged 35, x.-para, was admitted to the Maternity

Hospital. On vaginal examination the os was found to be fully dilated, but the membranes were unruptured. It was also discovered that there was a slight rachitic deformity of the pelvis, the C.D. measuring 4 inches. The membranes were ruptured artificially, and the head engaged in the transverse diameter, with the left parietal bone directed posteriorly. As no progress was made, after waiting for some time the House Surgeon applied forceps (Milne Murray's pattern). The head was grasped obliquely. It was drawn through the brim and cavity without much difficulty. The child, however, was found on extraction to have a spoon-shaped indentation of its left frontal bone fairly deep and extensive.

When I saw the child about an hour after its birth, I found the deformity as described. The child seemed quite strong, however, and as far as could be judged none the worse of the indentations. The House Surgeon informed me that it had only been very slightly asphyxiated at birth. He also explained how he had tried antero-posterior pressure, but had failed to remove the deformity. Pressing directly antero-posteriorly, I also failed, but when I changed the direction of pressure and compressed the head firmly in an oblique direction, applying one hand to the right frontal bone, and the other to the left side of the occiput the indentations gradually and completely disappeared. In this case the bone did not spring out, and the pressure exerted was greater than in Case I. I thought the reason most probably was that in the former case the bone was more ossified than in the latter.

Professor Simpson had listened with great interest to Dr Kerr's original and valuable communication. He (Professor Simpson) was only acquainted with Lelièvre's Thesis from a summary of it in the *Annales de Gynecologie*, and ever since he read it, had given more attention to the subject of birth fractures and depressions of the fœtal skull, and had taught that attention should be given to three varieties of depression—linear, spoon-shaped, and cup-shaped. As to causation, he had seen an indentation produced on a frontal bone with the rim of a forceps-blade, when the blades had been applied in the trans-

verse diameter of a flat pelvis to the fœtal head in its antero-posterior direction; but he agreed with the author in believing that such indentations were usually due to the pressure of the sacral promontory. With regard to the treatment, the air-tractor had been used in some such cases with success; but the instrument had fallen into disuse for the purpose for which Sir James Simpson had produced it. There would be room for the surgical measures adopted for elevating these depressions in cases where there was any suspicion that the depression was attended with the intracranial hæmorrhages which constituted a distinct danger to the life of the child. But the ingenious suggestion of Dr Kerr would no doubt now be adopted in many cases by his professional brethren. The proposal sounds so simple and sensible that one wonders that it has not been made long ago. If the Glasgow population suffers from the birth accidents of ricketty pelves, it was to be congratulated on having practitioners who could take advantage of their opportunities of observation to devise means to meet the troubles; and in this particular matter Dr Kerr was to be congratulated on the originality of his suggestion, and the success that had attended its adoption.

Dr James Ritchie said that he had heard on a few occasions of difficult passage of the head, and those not always in connection with the use of forceps, a distinct crack just at the moment at which the fœtal head passed through the pelvic brim, just such a noise as is heard when one indents a thin celluloid sphere, but he believed that in the majority of such cases the depression springs back naturally to its normal position. He had listened with much interest to Dr Munro Kerr's communication, and was much interested with the simplicity of the proposed method for the cure of those cases which did not return naturally to the proper position.

Dr Haig Ferguson had listened with much pleasure to Dr Munro Kerr's interesting paper. He thought it was greatly due to the President of the Society (Dr Milne Murray) that there were not more indentations and fracture of the fœtal skull, and that there was not more infantile mortality in instrumental labour. Before Dr Murray had mathematically demonstrated the proper curves of the forceps, and given

definite directions to instrument makers as to how to make the instrument, there was no guarantee that they were properly constructed, and as often as not they were defective. Dr Ferguson mentioned one instance where in the hands of one man, head indentations, still birth, dead birth, and convulsions were constantly occurring with his forceps cases. When his forceps were examined it was found they were not properly made; their curves were erroneous, and there was less than one inch between the tips of the blades. After this practitioner had acquired properly made forceps his difficulties ceased. Dr Kerr's paper was an exceedingly suggestive one, and the simple treatment he had devised for uncomplicated indentations seemed to be most rational and effective.

Dr Milne Murray was sure he expressed the feelings of those present when he said they had listened with much pleasure to this paper by Dr Munro Kerr, on a subject which had not, up to the present, been systematically discussed in the Society. When listening to the paper it had occurred to him that those cases in which Dr Kerr's method was likely to succeed were those in which depression of the bone had occurred without fracture. These would probably readily yield to this simple and scientific method of dealing with them. On the other hand, it seemed to him that cases in which fracture of the bone had occurred were less likely to yield to the application of pressure in the way described; because in those cases the edges of the fractured bones would probably be applied to each other at an acute angle, forming a ridge which would be directed inwards. In such cases an increase of pressure in the manner described by Dr Kerr would probably tend to drive the edges of the bones further into the cranial cavity. Seeing that it has been shown that antero-posterior pressure applied to the skull of the fœtus causes vertical elongation of the head, Dr Murray ventured to suggest that the pressure might with advantage be applied from above downwards at the same time, and as well as from before backwards. This would take advantage of the greatest possible efficiency of the applied pressure. As to the causation of these depressions, he had no doubt that they were usually the result of pelvic abnormality, but he thought that Dr Haig Ferguson

was quite right in attributing them sometimes to effects of badly constructed forceps. Quite recently he had such a pair of forceps sent for his examination, which the medical man to whom they belonged blamed for injuring several fœtal heads which he had delivered by them. On examination the fault of these was readily apparent. While the curves of the traction rod were quite correct, the cephalic curve of the blades was far too flat, and the points of the blades were too close, while the blades themselves were so massively constructed that they had scarcely any spring. A safe instrument should have three inches between the blades at their widest part, and a clear inch between the points. He thanked Dr Kerr for his interesting and valuable paper.

Drs Hart, Church, Fordyce, and *Mac Vie* also made remarks.

Dr Munro Kerr replied.

IX.—A CLINICAL NOTE ON A CASE OF ECLAMPSIA AT THE SIXTH MONTH—RECOVERY—SUCCESSFUL LABOUR AT FULL TIME.

By Michael Dewar, M.D., C.M., Edinburgh.

As a good many cases of puerperal eclampsia have been recorded during the past few years, and as its etiology and treatment have been fairly well discussed, a record of another case seems to be a redundancy. Yet, after all, we know very little about it, and it is only when its grim presence comes suddenly before us that we realise our heavy responsibility, and are impelled to record the facts, so that from a multiplicity of cases light may come out of darkness. You will therefore pardon me for laying a statement of this, my most recent case, before you.

The subject of the following notes is a married primipara, aged 28. She is one of a family of six, of whom four are alive, all females; two having died in infancy, a boy and a girl. The father died in 1879 of inflammation of the lungs. The mother and the three living sisters have all enjoyed good health. The mother had normal pregnancies and easy labours. Two married sisters have had nothing unusual in their married life. My

patient has had no illness during her lifetime, with the exception of measles in childhood and whooping-cough at the age of 20. She has not had scarlet fever. She is a well-developed young woman, bright and intelligent, and of a dark and pale complexion, and is in good circumstances as a working man's wife. Menstruation has always been normal. She never had fits of any kind up to the present illness.

During the first six months of her pregnancy she enjoyed perfect health, there being only slight sickness in the very early stage, and later on a little swelling of the feet and ankles, with distended veins, more on the right leg than on the left. She passed the ordinary amount of urine daily, which was normal in appearance and had no deposit. The bowels were constipated. On the day of the attack she was so well that she was preparing to visit her mother in Aberdeenshire for a week's stay. Suddenly, at 6.30 P.M. on the 27th June, without the slightest warning of any kind, she took a fit, and before I reached her house she had had seven fits in less than an hour. On my arrival at 7.20 P.M., she had just had the seventh fit, and was lying on her left side, with the knees partially drawn up, quite unconscious, the breathing stertorous, the pupils contracted, and non-sensitive to touch and light, and the face flushed. The skin of the body was moist, but not unduly so. The pulse was 120 of high tension. I could get no information as to the condition of the bowels or bladder, but on turning down the bedclothes I found that she had been passing urine involuntarily. Within a few minutes after my arrival she had another fit, the eighth, in which her face was drawn to the right. It began with a long tonic convulsion, succeeded by a series of strong and rapid clonic contractions, involving the whole of the body. The attack lasted about three minutes, followed by the condition she was in when I first saw her. I first emptied the bowels with a soap-and-water injection, having to scoop out hard scybalous masses with my fingers. While engaged in this little operation, she had another fit of the same character, the ninth, which lasted over two minutes. After this had passed off, I introduced a catheter and drew off a little more than a tablespoonful of urine. The bladder had been practically emptied involuntarily. The urine was non-albuminous. I

then examined *per vaginam*, and found the os closed and no discharge. On palpation the uterus was as it should be at the sixth month—no contractions—and on auscultation the fœtal heart sounds were distinctly heard. As she was seized with another fit (the tenth and the last on this occasion) shortly after, I sent for my friend, Dr Proudfoot. By the time he arrived, however, she was becoming conscious for the first time, and in the course of a quarter of an hour she was very much better, though dazed, and speaking as if she had not quite the control of her tongue. The tongue, on examination, was slightly abraded at the left side, but no blood or saliva appeared at the lips. We gave her a dose of bromide of potash and chloral, which shortly afterwards sent her off to sleep.

On my visit the next day, 28th June, I learned that there had been no more fits since I left the previous night. She was fairly comfortable, had slept pretty well, but was still confused and halting in her speech. The urine was plentiful, was passed voluntarily, and was non-albuminous. The K.Br. and chloral mixture was continued. She went on in much the same condition till the evening of the 1st July, four days after the first attack, when she had a second series of convulsions, seven in number, of the same character. On my arrival after the second fit of this series, I injected 10 minims of tinct. verat. virid., and on this occasion tried to control the convulsions with chloroform. When consciousness returned after the seventh fit, I administered a dose of K.Br. and chloral as before, and ordered her to have 10 minims of tinct. verat. virid. every six hours. On this occasion there was a trace of albumen. On the forenoon of the 2nd July I found that she had passed a fair night. The pulse was 80, much softer in character, but intermittent. On making a P.V. the os was normal and closed, and no discharge. The fœtal heart sounds were distinct. I stopped the tinct. verat. virid. and gave her a mixture of the bromides of ammonium and sodium.

On the evening of the 4th July—eight days from the first attack—she had a third series of convulsions, three in number. As her people were getting accustomed to them, I was not

sent for. I visited her on the 5th July, and found her again fairly well. No albumen.

From this day onwards she gradually improved — still somewhat confused in her mind, and the speech improving. I ceased my visits on the 11th July. The œdema and varicose veins were still present in both legs, more on right than left. There was no albumen in the urine on the last occasion examined.

On the 22nd September, almost exactly three months after the first series of convulsions, I was called to my patient at 7 P.M. On arrival I found her in bed, and received the report that she had been in labour since the forenoon. The os was well dilated, the bag of membranes protruding, and everything as it should be. As far as I could make out, the position of the presenting head was R.O.A. This was verified later on when the waters escaped. Labour went on uninterruptedly, and was completed at 9.30 P.M. naturally by the birth of a fine healthy boy. The placenta was extracted in a few minutes, and was perfectly normal in appearance. The swelling in the ankles disappeared very soon after the labour was over. Her progress was favourable, and she was well and going about in a fortnight. I saw her two weeks ago, and with the exception of a slightly defective memory, she was well and feeling well. The urine was normal and non-albuminous. The baby is a very fine specimen.

Remarks.—The question may now be asked, was this a case of eclampsia? I would not like to be positive, but I think it was. I know that some observers maintain, or at least assert, that it is no eclampsia without albuminuria. You will have noticed that there was no albumen during the first series of convulsions, only a trace during the second series, and no albumen during the third series. The legs and feet were œdematous, the right more than the left, but this was no doubt due to obstruction. The case *may* have been one of epilepsy, but there was no family history pointing to such a thing; there was no personal history, there was no aura of the slightest kind, there was no bitten tongue, only a slight abrasion of the side of the tongue against a sharp portion of a decayed tooth, and no frothing at the mouth. In the last

case of eclampsia which occurred in my practice three years ago, previous to this, there was a large amount of albumen present, but the convulsions were neither so numerous nor so severe as in this case, and it ended in the birth of the fœtus at the sixth month and the recovery of the mother. Again, in another case about two years previous to the last mentioned, convulsions occurred about the sixth month, and on the second day labour came on with the birth of a dead fœtus and also recovery of the mother after some time. There was *no* albumen during the fits or afterwards.

With such an experience, I think that in the absence of a definite etiology and pathology of eclampsia, it is quite as incorrect to say that there can be no case of eclampsia without albuminuria as it would be to say that ataxia without the Argyll-Robertson pupil is no ataxia. I would be inclined, therefore, to classify all cases of convulsions occurring during the puerperium as eclamptic, irrespective of the presence or absence of albuminuria, for as far as I have observed or read, it really does not much matter whether the convulsions be accompanied by albuminuria or not, as regards the safety of the mother or child. They seem to me to be both equally dangerous. That these convulsions cannot be entirely due to a condition of albuminuria with an excess secretion of urea and uric acid, is shown clearly by the fact that there are many cases of albuminuria in pregnancy, with swollen legs and puffy face, in which *no* convulsions occur during the whole puerperal period. If albuminuria had a proprietary right to eclampsia, every obstetrician would have to face a great many more cases of eclampsia in his practice than actually fall to his lot. There are evidently, therefore, some subtile conditions, of which we are at present unaware, existing, or ready to be called into existence, by peripheral or other influences, which determine what cases are to be affected by eclampsia and what are not. We all know how sometimes the simplest case of labour in which the greatest precautions have been taken will go all wrong, while cases of version and instruments, which have undergone any amount of rough handling, and which have occurred in houses possessing not the best sanitary arrangements, never cost the medical attendant a moment's worry

during the lying-in period. It is not enough to say that in these former cases it is septicæmia that does all the mischief. There must be something else which determines the septicæmia. There is the streptococcus behind, wherever it comes from, which is the initial cause. Again, it is a fact that only a certain proportion of cases of acute and chronic Bright's disease where the urine is scanty and loaded with albumen, develop uræmic convulsions; and more especially in chronic Bright, the case might go on for months without the slightest hint of it.

In a great many cases of eclampsia, the urine, I believe, has been examined chemically, and the number of corpuscles and leucocytes in the blood has been counted, but I would like to ask if a systematic bacteriological examination of the blood in eclampsia has ever been made. I am not sure that it has, but perhaps someone may be able to put me right on that matter. It is quite probable that a toxin produced by chemical changes in retained fæces (and we know that constipation occurs as frequently in those cases as albuminuria) may be the determining factor of the convulsions in many cases, at least there is room for such a theory where albuminuria does not exist. Again, it is quite possible that a bacillus may be found, and be the initial cause of the convulsions, just as the earth bacillus is concerned in the production of tetanic convulsions. By way of supporting this view, we have recently had a diplococcus demonstrated as being present in acute rheumatism, a disease, the cause of which has baffled medical experts for centuries. I throw out the suggestion to those bacteriologists who have the time and the means to carry it out.

Then as regards treatment—chloroform seems to be the sheet-anchor for controling the convulsions. I am not sure, judging from my own limited experience, and from what I have read, that chloroform has very much effect for good. I confess that when I see a patient in the throes of a fit, and when evidently during the tonic and clonic spasms not a particle of air is entering the lungs, and the blood is becoming every second more and more charged with carbonic acid, I shrink from using chloroform; while afterwards, in the comatose condition, I never can understand what good chloroform can

do except to deepen the coma. I have never used morphia, and do not intend using it in any future case, as I believe that in albuminuria it is practically fatal, owing to its interfering with the bowel and kidney function. I cannot speak of veratrum viride, except that in my case the heart became intermittent after the first few doses, when I deemed it advisable to stop it. As regards saline solution I have no experience, but I would imagine that while after a time it increases the quantity of urine, and thus clears out an excess of urea and uric acid, it must tend to increase the heart tension at first, and surely that is high enough in all these cases.

I believe that a little more of the expectant treatment, after attending to the bowels and bladder, with the administration of the bromides and chloral, is perhaps the best method of managing such cases. If there be no signs of nature having commenced premature labour, I would wait for a day or two at any rate before practising fœticide; but if the os was opening up, and uterine contraction taking place, the sooner the uterus is emptied the better.

Dr Haultain thanked Dr Dewar for bringing forward this very interesting case. He could not, however, agree with him that it was a case of eclampsia unless the term eclampsia had been used in the general sense of any form of convulsions occurring during pregnancy. His definition of eclampsia was convulsions with severe albuminuria. He had had a very considerable experience of eclampsia during pregnancy, all of which were associated with renal insufficiency. In these cases when the fits were successfully combated, the albumen in the urine correspondingly decreased, and in some instances entirely disappeared. When only temporarily stopped, the approach of future convulsions was always associated with an increase in the albumen and diminution in the quantity of urine. Fits without albuminuria might be epilepsy, intracranial hæmorrhage, or hystero-epilepsy; to the last of those he attributed the convulsions in Dr Dewar's case. The etiology of eclampsia, every one knew, was still to be discovered; lately much had been done to try and elucidate the problem, and the lines upon which a most reasonable explanation lay were those which

pointed to its origin from a want of metabolism, which gave rise to toxines in the blood which irritated the kidneys in their attempts at its elimination, and gave rise to albuminuria. To enter at this late hour into a detailed discussion on these points would be out of place, but he thought an evening of the Obstetrical Society would be well spent if allotted to a discussion on eclampsia, whereby perhaps some valuable hints might be acquired which would tend to focus our opinions along lines which would help us in treating cases upon scientific principles.

Dr Milne Murray had listened to Dr Dewar's carefully detailed case with the greatest interest. The subject of puerperal eclampsia is one of the most urgent and important of obstetric problems, and it is of the utmost importance that cases of all sorts, and especially those possessing special features like this one, should be recorded with minute details, as Dr Dewar had done. He quite agreed with the suggestion which had been thrown out by previous speakers, that the subject of eclampsia might with much advantage be formally discussed by the Society. Such a discussion would very definitely bring out the limits of our knowledge of this matter, and might suggest the lines along which further progress should be made. One thing above all others appeared to him of importance in dealing with this most difficult and obscure problem, and that was that we should approach it with a perfectly open mind. We have very slight grounds on which to dogmatise as to the nature of the causation of this condition, and as little as to what are the essential relations of it. On this account he most certainly joined issue with Dr Haultain on two points. The first was when he asserted that this was in his opinion a case of hystero-epilepsy, and not one of eclampsia at all: basing his opinion chiefly on the slight amount of coma which followed the fits. Now he (Dr Murray) had had a considerable—and, he regretted to say, an unfortunate—experience in this disorder, and among others he recalled one in which a woman, after at least five or six severe fits, was within an hour able to give a perfectly natural and coherent account of her previous history; and yet this woman succumbed soon after her delivery, and there was no doubt whatever that this was a case of genuine

eclampsia. The next point in which he entirely disagreed with Dr Haultain was on the question of the essential association of albuminuria with eclampsia. Dr Haultain declared that there could in his opinion be no eclampsia without albuminuria. Now since Seyfert of Prague many years ago showed that there were some cases of eclampsia without albuminuria, others from time to time have made the same observation, and he had no doubt that these observations were perfectly accurate. Some years ago Dr Haultain will recollect he assisted him (Dr Murray) with a patient who died soon after delivery, and in this case, while albumen was present during the seizures, there was not a trace in the urine which had been carefully examined the day before. Last autumn a patient while being confined in the Maternity Hospital had two severe fits during labour, and one equally severe about two hours after. The ordinary tests showed no albumen at the time, but on the following day a profuse precipitate of an albumose was obtained, which remained in diminishing amount for a couple of days. It is such cases as these which show the many-sided character of this mysterious disturbance, and which in our present state of knowledge or of ignorance, call for an open mind free from preconceived ideas and dangerous generalisations. Up till recently our view of the subject had been obscured by the renal hypothesis of its causation, and there was some danger of a similar or even more hopeless tangle arising from an equally untried hepatic hypothesis. At the present moment it is of the utmost importance in connection with the elucidation of this matter that we should possess a series of careful clinical records, such as this of Dr Dewar's. And we are indebted to him for the care he has taken in bringing it before us in the graphic way he has done.

Professor Simpson and *Dr MacVie* also spoke.

Dr Dewar replied.

MEETING III.—JANUARY 9, 1901.

Dr MILNE MURRAY, *President, in the Chair.*

I. The following gentlemen were elected Ordinary Fellows of the Society:—J. R. Munro, M.B., Ch.B., 1 Prudhoe Street, North Shields; G. J. R. Carruthers, M.B., Ch.B., 4 Melville Street, Edinburgh.

II. *Dr J. W. Ballantyne* showed DIAGRAMS to illustrate a scheme of fœtal growth.

III. *Dr Haig Ferguson* showed a FIBROID UTERUS removed by abdominal hysterectomy. The case was interesting from two circumstances—first, as regards the symptoms, and secondly, as regards the subsequent history. The patient was unmarried, and 38 years of age. She was exsanguine from severe hæmorrhage which resisted all treatment, and she suffered in addition from pressure symptoms affecting chiefly the nerves of the lower extremities, and producing great pain, tingling, and slight paresis. The tumour grew from the posterior wall of the uterus, and though not very large it could not be raised off the sacral nerves so as to mitigate the pressure. The patient was rendered absolutely unfit for anything in consequence of all this, she could not sleep for pain, and she could walk or stand very little. Some fifteen years ago Dr Ferguson had seen a similar case where the pressure of a large fibroid in the pelvis first led to paralysis in the lower extremities, and the patient ultimately died of multiple cerebro-spinal sclerosis, apparently from upward extension of the nerve irritation. Secondly, as regards the subsequent history, the operation was not a difficult one and the patient did well to begin with. The bowels moved in due course and the patient began to enjoy food. The pulse and temperature were uneventful. The patient expressed herself as being free from pain and feeling better than she had done for months. Four days after the operation she suddenly complained of faintness, her pulse became almost imperceptible, and she died shortly afterwards. No examination was made except of the abdomen; the

abdominal wound was well on in the healing process, there was no peritonitis, and no hæmorrhage or serum in the peritoneal cavity. Everything was as normal as could be. Death was therefore evidently due to heart failure, or embolism. Most probably it was heart failure, as she had a mitral systolic murmur, and was much exhausted generally before operation with hæmorrhage and continued pain. Dr Ferguson showed the specimen as he thought it was well to bring forward cases which showed uncommon manifestations and did not present the usual and fortunately most frequent result of uneventful recovery.

IV.—ON INTRA-PERITONEAL RUPTURE OF SIMPLE OVARIAN CYSTS, WITH SPECIAL REFERENCE TO OPERATIVE TREATMENT.

By F. W. N. Haultain, M.D., F.R.C.P.Ed., Lecturer on Midwifery and Diseases of Women, School of Medicine, Edinburgh.

The spontaneous rupture of simple ovarian tumours, though a comparatively uncommon accident, is a subject worthy of more consideration than has hitherto been devoted to it. In the course of the operations I have performed for these growths, I have met with three cases in which the cyst wall was torn and the contents evacuated into the peritoneal cavity, while in three other cases a distinct history of previous rupture was elicited.

When considered in detail, individually and collectively, they present points of sufficient practical importance to warrant attention, I trust, worthy of the Fellows of this Society, and it is on this assumption I take the opportunity of bringing the subject before you. The cases are as follows:—

Case I.—Mrs C., æt. 53, I saw in 1892 with Dr M'Donald Robertson. She had complained for over a year of an abdominal swelling, for which she had refused operative treatment. One day on poking the fire she suddenly experienced an intense pain in the abdomen, which gradually increased. On examination twenty-four hours afterwards, the abdomen appeared diffusely distended, and was so tender that palpation could only be

accomplished under an anæsthetic. By bimanual examination an ill-defined fulness of the abdomen could alone be made out. Pulse, 120; temperature, 99·6°. From the previous history of tumour in abdomen, it was decided to explore the abdomen without delay, as it was evident some active change was present. Laparotomy showed the peritoneal cavity to be filled with a thick, deeply blood-stained fluid, which had escaped from an ovarian cyst, at the same time the peritoneum was red and congested. The cyst was removed and the peritoneal cavity flushed out and cleaned, and a glass drainage tube left in the abdominal wound when closed. Recovery was uninterrupted.

CASE II.—Mrs H., æt. 35, recommended by Dr Hutton, suffered from a medium-sized ovarian tumour. As operation was not urgent, she desired to wait a few weeks, which was agreed to. In three weeks she returned, stating she thought the growth had much decreased in size as evidenced by the fit of her corsets. On examination now, the abdomen, though distended, presented a changed appearance to formerly. No well-defined tumour was present, merely a diffuse abdominal distension. After careful measurements were made, it was decided to wait for results. On returning three weeks later, the measurements were slightly greater than before, and though the patient was comparatively comfortable, I recommended operation.

On opening the abdomen, it was found to be filled with a thick gelatinous fluid, which had escaped from a displaced cystic growth of the left ovary. The peritoneum appeared healthy. The collapsed cyst was removed easily, as there were no adhesions, and an attempt was then made to cleanse the peritoneum of the sticky viscid fluid. This proved very partially successful, but as from the history of the case the fluid appeared innocuous, I decided to close the abdomen without draining, and a quart of saline solution was introduced before closure. The result proved highly satisfactory.

CASE III.—Miss L., æt. 25, recommended for operation by Dr Stirling, Perth, suffered from a large ovarian cyst. Not having a vacant bed in my hospital to give her, I asked her to return in a month. The patient returned as asked, in her usual

health, and I did not examine her again previous to operation; but when about to operate I was much struck with and commented on the change in the contour of her distended abdomen. On entering the peritoneal cavity, I found it filled with a dark, blood-stained fluid of the consistence of porter. The peritoneum was deeply injected, and the collapsed cyst wall was very extensively fixed to the surrounding structures by highly vascular recent adhesions, which were very easily separated. After removal of the cyst the peritoneum was flushed out, two quarts of saline left in the cavity, and the abdomen closed without drainage. Recovery was uninterrupted.

For the notes of Case IV. I am indebted to Professor Kynoch, Dundee, under whose care she was treated. Patient, æt. 68, complained of abdominal swelling, which she had noticed for eighteen months. She previously had an abdominal swelling thirteen years ago, which had twice been tapped at intervals of three years; but six years ago, when on the way to have it again tapped, she was run over by a cyclist, and on getting up felt the abdominal swelling no longer. For a few days after her accident she passed considerably larger quantities of urine than usual. The present swelling, which reached up to the umbilicus, she had known of for eighteen months.

Laparotomy revealed extensive adhesions to the abdominal wall. The contents of the main cyst were thick and gelatinous, a few smaller secondary cysts were noticed, but no appearance of scar from previous rupture.

Case V.—Miss S. I also saw with Dr Stirling, Perth, in 1886. She suffered from an ovarian tumour, which, as an eminent gynæcolgoist had refused to remove, had been tapped frequently for four years. Two years previously to the growth of the present swelling, she had suffered from a similar abdominal swelling, which had suddenly disappeared. An attempt at removal was undertaken, but proved unsuccessful, as no line of demarcation between cyst wall and abdominal parietes could be made out. I decided therefore to evacuate and drain the cyst, irrigating the cavity with weak iodine lotion, 1 dr. to the pint. Irrigation was continued for twelve months

till the cyst was entirely obliterated. Though it is now fourteen years since, there has been no return of the swelling, and the patient is in good health.

CASE VI.—Miss D., æt. 26, was sent for operation by Dr Davidson, suffering from an ovarian tumour. She gave the history that five years previously she had a similar abdominal swelling, which under medicinal treatment entirely disappeared.

On abdominal incision an exactly similar condition to Case V. was present, the cyst wall and abdominal parietes being thoroughly incorporated. Although I tried to separate them at several points, attempts to invert the cyst failed, and showed posterior adhesions. I therefore decided on a similar mode of treatment. Evacuated the cyst and irrigated. In five months the cyst became obliterated, and although it is now only two and a half years, there is no evidence of return by the most careful bimanual examination.

On reflecting over the cases cited, one is struck by the marked difference in the clinical features which may be presented.

In the majority of instances, rupture is apparently unassociated with discomfort, and it is therefore only in those cases where they have been of sufficient size to have attracted attention that any knowledge of such an occurrence can be elicited. It is probable, therefore, that spontaneous intra-peritoneal rupture is common in small cysts which have not given rise to any symptoms (as is usual in such tumours), and it is also probable that before the days of ovariotomy many large cysts have through rupture become spontaneously cured. Now, however, they have little chance of such a termination, as their complete removal has become an operation of such comparative safety.

The absence of symptoms is doubtless due to the innocuous contents of the cyst and to their slow escape, a sudden gush being prevented by the intra-abdominal pressure—the peritoneal cavity being merely potential. The large proportion of recorded cases are examples similar to Case I., in which severe and dangerous symptoms supervened. Thus Palm, in his collected statistics of twenty-five cases, records eighteen deaths, three from collapse, six from acute peritonitis, three from chronic

peritonitis, and six from protracted fever. Likewise, Nepreu, in 155 cases, shows sixty-five to have terminated fatally. In these instances the contents of the cyst must have been intensely irritating, and in many cases probably septic, while in a certain proportion death was accounted for from hæmorrhage. The causes of rupture are numerous, such as violence, morbid processes in the cyst wall, the result of thrombi, and intra-cystic hæmorrhage. Nutritive disturbances on the wall, the result of tension of the pedicle, is a further frequent cause. Perhaps the commonest variety of cyst to spontaneously rupture is that with gelatinous contents, the cyst wall becoming secondarily softened. The gelatinous contents are, as a rule, more irritative, but at the same time are but slowly absorbable by the peritoneum, and may continue to distend the abdomen. It is therefore possible that this accounts for the greater frequency with which they are found ruptured, as when the contents of a cyst are more fluid and more readily absorbed, operation is seldom undertaken after collapse of the cyst and disappearance of the abdominal swelling. Indeed, from the history of Case II., it would appear as if, after rupture of a gelatinous cyst, secretion of the mucoid contents continues and further distends the abdominal cavity.

In cysts with innocuous contents, where no abdominal symptoms supervene after rupture, it is important from a practical standpoint to consider their further causes. In a certain proportion, ready absorption of the extravasated contents occur, and permanent obliteration of the cyst follows. This occurs most frequently in unilocular broad ligament cysts, where the fluid is practically normal saline solution and is extremely rapidly absorbed, giving rise to temporary polyuria. Whether in these cases there is actual intra-peritoneal rupture or merely rupture of the cyst wall, and evacuation of the contents between the layers of the broad ligament walls, is doubtful. I am inclined to think that in the majority of cases the rupture is extra-peritoneal.

In other series of cases there is a ready absorption of the escaped fluid, without peritoneal irritation, but the tumour re-appears from redistension of the cyst or growth of secondary cysts. This must be looked upon as of comparatively frequent occurrence, for to those of us who have the opportunity of ex-

amining many ovarian tumours, evidence of such is frequently found by the presence of cicatrices in the cyst wall.

When, however, the contents of the cyst, though absorbable, tend to cause irritation of the peritoneum of a subacute type, we have inflammatory adhesions formed between the cyst wall and surrounding structures, which, on redistension of the cyst, may form an almost insuperable barrier to subsequent removal, as in Cases V. and VI.

That this is so is borne out by experience, not only in cases of rupture, but also after tapping. I have removed cysts which have frequently been tapped and yet found no adhesions, while, on the other hand, as is well-known, previous tapping undoubtedly predisposes to adhesions. In the former it is probable the cyst contents are more irritative, while in the latter they produce chronic peritonitis with resulting adhesions. Though sufficiently irritative to produce adhesions, these may be so insidiously formed as to give rise to no symptoms of pain or discomfort, and we may infer that in many of those closely adhered tumours which have never been tapped, the adhesions are the result of previous rupture of a loculus. Fortunately the strongest and most frequent seat of adhesions is between the cyst and the surrounding parietes or omentum—as ready adhesion to the intestines is prevented by their constant movement.

In a certain group of cases, practically lacerated cysts with gelatinous contents, no absorption takes place. At the same time, from mucoid degeneration of the cyst wall the seat remains patent, and active secretion continues, which results in a steady increase of abdominal distension from free intra-peritoneal fluid.

Treatment.—Assuming that what has been stated regarding the effect of rupture be correct, there can, I think, be but one opinion that ruptured cysts should in all cases be removed as soon as possible. Doubtless it is true that after rupture a certain proportion disappear never to redistend, and spontaneous cure is attained; but, on the other hand, it is equally certain that a certain proportion redistend after having acquired a close connection to the surrounding structures through inflammatory adhesions, which at the best complicate severely their sub-

sequent removal, and may, as in Cases V. and VI., practically prevent their enucleation altogether. I may say that these two cases are the only simple ovarian cysts I have felt justified in not attempting to remove, out of a series of over 100 operations for these tumours.

I have on other occasions found strong adhesions to the anterior abdominal walls, but by being able to partially invert the cyst walls, have convinced myself that the adhesions were more or less local, and so proceeded to remove the cyst. In Case VI., however, my attempt at inversion was useless.

Having been certain of the presence of an ovarian tumour, its sudden or gradual disappearance should be an incentive to operation, although to the patient and her friends it usually appears otherwise. This line of treatment naturally assumes an absolute certainty of diagnosis of the pre-existing tumour, which in large growths is more or less easy.

In smaller tumours, however, which have not attracted the patient's attention by abdominal distension, the situation is more involved and difficult, and the question of operation must equally depend on the operator's estimate of his diagnostic powers. To my own mind I am certain of having felt on one occasion a cystic ovarian tumour the size of a cocoanut, which on subsequent examination some weeks after had disappeared. In this instance, I regret to say, I had not the force of character to justify me in operating, although the first time I saw the patient I strongly urged the procedure.

If a ruptured cyst has not been diagnosed at the time of operation, one is apt, in entering the peritoneal cavity, to be misled by the gush of ovarian contents to assume that the cyst wall has been incised and an attempt made from suspected adhesion to the abdominal parietal to separate the cyst wall. In these cases one is liable, as I did in one instance, to strip the parietal peritoneum from the abdominal wall. It is well, therefore, in all cases where any contents thus escape, to enlarge the opening and introduce the hand into the cavity before attempting to separate the cyst wall.

The treatment of perforated cysts associated with acute symptoms, it need hardly be said, must be operative. The diagnosis, however, of their condition must in certain cases be

extremely doubtful, unless a distinct history of pre-existing abdominal tumour be present. The symptoms are so closely simulated by perforation of the intestine, and other acute affections of the peritoneum, that in the majority of instances the operation must, in the first instance, be purely exploratory. Should a ruptured cyst be found, after removal of the growth, free irrigation of the abdominal cavity will be called for, and if subsequent drainage, preferably through the posterior fornix.

In conclusion, I may add I have confined myself to the rupture of simple cysts, to the exclusion of the papilliomatous variety, which are locally malignant and have a special predisposition to perforation of the cyst wall. From our inability to diagnose these without visual examination, and appreciating their tendency to secondary peritoneal infection, an additional incentive is added to the immediate removal of all ovarian cystic growths, an operation which, when early undertaken, is, thanks to our improved aseptic methods, almost devoid of risk.

Professor Simpson said he had listened with great interest to this communication. The Society, he thought, was much indebted to Dr Haultain for the history of the six cases he had met with himself, and for bringing before them the relations of ruptures of ovarian tumours to their treatment. He did not suppose Dr Haultain claimed there was anything new in the kind of observations he had made. At the same time it was extremely important to the profession that such cases as these should be carefully recorded. They all recognised that in Dr Haultain they had such an able ovariotomist that they expected he would give them, from time to time, observations he had made on specially interesting cases. As regarded any of the observations Dr Haultain had made with reference to the symptoms, diagnosis, or treatment, he would only say he had himself seen a good many cases of ruptured ovarian tumours, both where the abdomen was opened, and where it had not been opened. With regard to the latter class, where the tumour disappeared, he had a kind of impression that they had to do rather with the parovarian tumours. There was just one point on which he was disposed to join issue with Dr Haultain

—where he suggested that the fluid escaped into the broad layers of the ligament among the cellular tissue. If the contents of a tumour entered the broad ligament, it could only do so through some vessels having been torn up at one time, so that there would be a hæmatoma at the same time. The fluid from a ruptured cyst had not of itself an expanding power, and where the tumour disappeared so suddenly as in these cases, he was sure the fluid escaped into the peritoneal cavity, where it disappeared, the surface of the peritoneum having great absorbing power. For a time before ovariotomy became established, it was proposed, and in one case he had seen it done with good result, to open the cyst wall with a wider trocar than was employed in the ordinary tappings of the ovary, so that the fluid escaping into the peritoneal cavity was immediately absorbed and the tumour gradually disappeared. One of the most interesting results of rupture of the tumour was where they got gelatinous matter escaping from relatively small cysts, and where the gelatinous matter was somewhat tenacious, where there was development of what Werth described as pseudo-myxoma peritonei—showing tough gluey masses spread through the abdominal cavity adhering to the different viscera where they became somewhat vascular. In one or two cases where he had difficulty in removing all the gluey matter, he had satisfied himself, as Dr Haultain had done, with partly washing out, and the patient recovered. He remembered the case of an old woman with that condition who recovered slowly from the operation, and then afterwards there was a long wasting kind of peritonitis resulting, as if there was not energy enough in the system to reabsorb the fluid in the viscera, and she eventually died. He had shown the Society a year or two ago at different times preparations from patients, quite young women, one a girl of sixteen and the other a multipara of twenty-seven, in whom there had been a burst ovarian tumour. The patients were both almost moribund when he operated and removed the ovarian tumour and washed out the abdomen. The curious thing was that in both these cases, which occurred within a year of each other, degeneration set in in the general peritoneal cavity, and the remaining ovaries were also involved. Further operation in these cases was hopeless. Although they

could at any time perform a perfectly successful operation on a tumour that had burst, and wash out the cavity and get seemingly good results—since he had seen these two cases occurring in relatively young women, he would have reservation in his prognosis as to whether there was a possibility of recrudescence of further mischief afterwards. At last meeting of the Society he had shown a case of tumour burst when the patient was in the ward. The patient had been subjected to a clinical examination in the ward where the outline of the tumour was distinct and the fluctuation recognised by the students. Then she got symptoms of sickness and the tumour burst. This patient made a quite complete recovery, and they sent her to the country telling her she was cured, but they reserved in their minds the possibility of the development of the malignant tendency in the abdominal cavity afterwards. Dr Haultain had rightly said that where there was evidence of an accident having occurred the proper treatment was to open the abdomen. The abdominal cavity was somewhat of a lottery to go into, but in this case they might open with the greatest confidence of doing the patient good. They might clear out the abdominal cavity for a time and give relief if the tumour was adhering, but he had not seen a tumour adhering which they were not able to remove. He (Professor Simpson) begged to be allowed to add, in answer to a question of one of the Fellows, that peptonuria had been found in some patients who had been the subject of ruptured ovarian tumours. In the case he had last referred to, the urine was found to contain a quantity of albumen with some unusual reactions. It had been sent to a pathologist for more systematic analysis, but no report had been sent to the ward.

Dr Berry Hart said that Dr Haultain had brought up a very interesting subject. With reference to parovarian rupture, of which he had seen cases, there was, as Professor Simpson had indicated, always a suspicion that they might get some malignant development afterwards. There was no doubt as to the treatment, namely, removing the tumour and treating as they did now. Dr Haultain had given a very clear exposition of the subject. The only question as to the extra-peritoneal rupture was whether he expected sudden collapse.

Dr Haultain said it was merely an idea.

Dr Berry Hart said one would expect a slow thing, and he did not think it was very likely that there would be sudden collapse.

Dr Foulis said Dr Haultain had referred to the Palm's and Nepreu's statistics in which something like 50 per cent. of the ruptured cysts died, but one did not know whether these were malignant cases or not, nor did Dr Haultain say how long it was after rupture that the patients died.

Dr Haultain said these were old statistics.

Dr Foulis said it seemed an enormous number of deaths from ruptured cysts. He could not help thinking of his own interesting observations years ago in connection with the subject. He could not tell them how many cases of ovarian fluids came under his notice for examination microscopically, but there were many instances where his microscopic diagnosis proved correct. He wondered whether the fluids from the peritoneal cavity were examined at the present day as they should be, for it was certain that if there was a ruptured cyst the fluid of the peritoneum would contain some of the elements of the ruptured cyst. But a great many of the ovarian malignant tumours were not cystic at all; they were cauliflowery, and ate their way through the cyst, and shed their cells into the peritoneum. They might remove a small malignant tumour of the ovary with good result, but there were a great many cases under observation where the abdomen was full of fluid and bloody serum, and in this they found the malignant masses, which he had figured afterwards with the utmost care and which he was satisfied were diagnostic of malignant peritonitis. When they found sprouting masses in the bloody serous fluid they might be certain that there was malignant peritonitis. He hoped the microscope would assist in the diagnosis of these cases of ruptured cysts which seemed so common.

Dr Ferguson said there was only one point to which he wished to refer, as after the full remarks of Professor Simpson there was little left to say. One important thing that struck him in Dr Haultain's paper was the question, in cases of adhering cyst, of opening the cyst first to see exactly whether one was dealing with a cyst or an encysted peritoneal effusion. In

two cases he had seen, the peritoneum was stripped from the abdominal wall in mistake for the cyst wall. The other day he met with a case where he diagnosed a large ovarian tumour where it turned out to be a small malignant tumour such as Dr Foulis described, with encysted peritonitis which gave the typical characteristics of ovarian tumour. The curious thing was that the peritoneum was about a third of an inch thick all over and gave one the feeling of a cyst wall. On cutting down through the abdominal wall one found the supposed cyst adhering to the abdominal parietes. This should always make one suspicious of encysted peritoneal effusion. He opened into the supposed cyst, and discovered it was full of fluid and found the intestines inside, thus avoiding the mistake of stripping the peritoneum from the abdominal parietes. It was an important thing that Dr Haultain insisted on—the opening of the cyst before separating what one took to be adhesions. He was much interested in Dr Haultain's paper and his clear exposition of the cases.

Dr Haultain thanked the Fellows for their criticism. He claimed no originality; the paper was purely a clinical one. The reason he brought the subject before the Society was in order to have a clear understanding as to the treatment of those cases of ruptured cyst. Not two months ago he was asked to see a lady who had undoubtedly an abdominal tumour, and an operation was decided on. About a week afterwards the tumour disappeared. The patient and her friends were quite joyous on the subject, and would have no operation. The doctor in attendance also thought this was a most excellent case of spontaneous cure, and rather supported the people in their idea. On the other hand he himself strongly urged operation. The reason he urged the operation was because although it might be a spontaneous cure, he felt at the same time that there might be strong adhesions formed, and that a much more complicated and difficult operation would be required in the future if the cyst refilled. He was glad to hear this expression of opinion from the Society, for evidently they supported him in recommending an operation, even though the cyst had ruptured and there had been no symptoms whatever of peritonitis, as the formation of these adhesions undoubtedly

caused no discomfort to the patient. It was a large subject, and one on which from their pathological knowledge it was extremely difficult to form a definite opinion. The point Dr Ferguson spoke of was also important—that was the tendency when one opened the peritoneal cavity and saw the dark fluid exceeding to imagine they had entered the cyst wall, and attempt to separate the cyst wall from the parietes. He had done so twice, and now before attempting to separate, he always pushed his hand in and saw whether the hand was in the abdomen or the interior of the cyst. The paper was purely clinical, but it was important to bring forward these little points so as to obtain a clear understanding as to the concensus of opinion.

V.—UTERINE RETRACTION WITH SPECIAL REFERENCE TO THE MECHANISM AND MANAGEMENT OF THE THIRD STAGE OF LABOUR.

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THE question of the mechanism and management of the third stage of labour is at present in a curiously paradoxical position. The view that the placenta is separated in the main by an extreme diminution in area of the placental site is the popular one, and should have as its result the adoption of the Credé method of managing the third stage of labour. Practically, however, this method has been abandoned so far as the separation of the placenta is concerned, and an expectant plan adopted.

The view of placental separation advocated by me in papers read before this Society and the Royal Society of Edinburgh has not been generally accepted. I urged then that the separation took place after the "pain," and it thus followed that an expectant treatment during separation in the third stage of labour was best. This is the treatment usually followed by all, but the reason for it is disregarded.

Another curious point is that the study of actual uteri with

the placenta partially separated or still attached has not hitherto cleared up matters but rather puzzled us all. For instance, the Porro uteri so carefully examined and beautifully figured by Barbour in his splendid monograph, left the advocates of placental separation from placental-site-diminution in this unsatisfactory position, that what they had expected did not happen; the placenta was still attached, although the area of the placental site had shrunk from 17·5 × 17·5 cm. (end of pregnancy) to 10 × 10 cm., and the uterine wall thickened from 5 mm. to a uniform one of 37 mm.

Third stage uteri obtained by *post-mortem* examination, conveniently termed "intact third stage uteri," are even more disconcerting and perplexing to all. The curious point is that where the placenta is attached, the uterine wall is relatively thin as compared with the Porro uteri (5 mm. as to 37 mm.), showing retraction not well marked; while it is thicker on section where only membranes are attached, thicker still where the placenta has been in part separated, and thickest of all above the site of a uterine rupture.

We may sum this up by saying that the safe expectant treatment of the separation of the placenta in the third stage of labour depends on a generally rejected view of its mechanism, while the view of the management—deducible from the generally accepted mechanism—is now believed to be dangerous. Finally, if one accepts the Porro uteri as normal evidence of separation of the placenta, one cannot understand the "intact uteri."

For some years I have puzzled over these discrepancies, and as I now believe I have a feasible solution of the apparent anomalies, I wish to raise the whole question again. Of special material not yet published (with two exceptions), I have two valuable intact third stage uteri I owe to the great kindness of Sir Henry Littlejohn and Dr Harvey Littlejohn; one Porro uterus, two *post-mortem* Cæsarean section uteri, several pregnant uteri (third, fourth, and seventh month), several *post-partum* uteri, and of course the wealth of drawings of sectional anatomy of the pregnant and parturient uteri obstetricians are now so fortunate in possessing.

The first thing is to define uterine retraction. By this I understand that the uterine muscle, after a contraction or

"pain" is over, retains in part the thickening of the contraction. Retraction, which thus includes contraction, is a property of the uterine muscle above the retraction ring of labour, and we can thus say that during labour the muscular wall above the "retraction ring" thickens, and gradually diminishes the capacity of the cavity it bounds; while all below the retraction ring, *i.e.*, down to the os externum, thins relatively, and the capacity of the space bounded above and below by these limits, increases. In a simple contraction, on the other hand, the thickening and shortening of the uterine muscle passes off after the stimulus causing it has ceased to act, and the muscle resumes the form it had prior to the contraction.

We have no means of directly determining clinically the amount of retraction during and immediately after labour. We have therefore to fall back on the sectional anatomy of uteri as displayed in the various stages of labour. We have no evidence that they give the actual thickening of a pain, or that the pain has been fixed by *rigor mortis*, but they do, I hold, exhibit evidence of uterine retraction. *Post-partum* uteri undoubtedly do and the others also, as they show a definite inequality of retraction, as we shall see presently.

In studying and tabulating this evidence we take the various sections of the pregnant parturient and *post-partum* uteri and measure the average thickness (1) of the uterine wall at the placental site, and (2) of the site of the membrane attachment. Two measurements of each are taken, and the half gives a fair value (Fig. 1).

I take first the pregnant parturient (first and second stages), intact third stage and *post-partum* uteri. The Porro uteri I reserve for special consideration.

These measurements I have plotted out in a curve, one showing them in normal labour, and the other where we take the Porro uteri in place of the intact third stage uteri. In the first the result of retraction is little marked until the immediate *post-partum* stage, when it is very evident, uniform, and symmetrical. In the second curve involving the Porro uteri, we get marked third stage retraction. The retraction where the

placenta is not attached is always marked, *i.e.*, the uterine wall is thicker.

The question now arises as to what we can deduce from the thickness of the uterine wall on section at the placental site as to the internal area. We may state this broadly as follows. There is a relation between the thickness of the uterine wall and the area of the placental site such that increase or diminution in the one means diminution or increase in the other. Thus a 5 mm. thick uterine wall means approximately a 17·5 × 17·5 cm. placental site; a 30 mm. thick uterine wall means approximately a 10 × 10 cm. placental site, and so on. This of course follows from the elementary fact that if we take a definite length of uterine wall on section bounding a definite rectilinear area of placental site, the product of the thickness

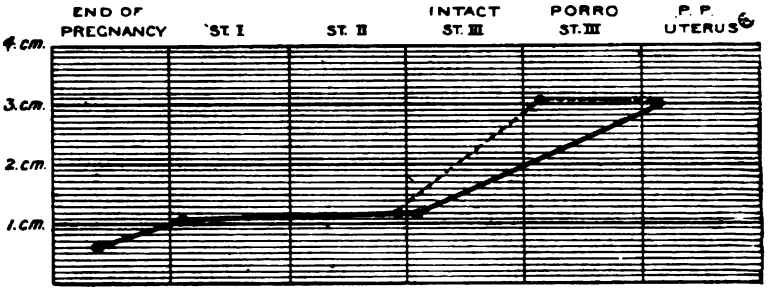

FIG. 1.—The lower black line shows the thickening and retraction at the various stages of labour in a normal case. The dotted line shows the third stage retraction in Porro case.

of the wall into the breadth and length of this area will give the cubic content. If we imagine this definitely mapped out portion to retract, then the thickening of the uterine wall must be accompanied by a definite diminution in the other diameters so as to keep the cubic content constant. We may accept, therefore, the thickness of the uterine wall at the placental site as giving an index to the diameters of the placental site.

The second curve differs from the first, inasmuch as the Porro uterus shows an amount of retraction greatly exceeding that of the third stage intact uteri, and nearly equal to that of the *post-partum* uterus of the first day. It seems to me, therefore, that a cardinal mistake has been made in considering the

amount of retraction of the Porro uterus as indicating the retraction necessary in the normal third stage uterus, and an equal mistake in demanding a more marked retraction than that of the Porro uterus for the separation of the placenta. The Porro uterus is a pathologically retracted uterus, as the mesial incision allows the circular fibres to retract unduly, while the amputating stroke permits a like undue retraction to the longitudinal fibres.

Champneys and Sänger have also drawn attention to the unnatural conditions of the Porro uteri, and Sänger held that its retraction is hindered.

I defer till afterwards the statement of what we can deduce from the Porro uteri as to placental separation.

In Fig. 2 we see that the thickness of the uterine wall in parturient uteri is always less at the placental site where the

FIG. 2.—Intact third stage uterus with placenta unseparated.

placenta is unseparated than where the placenta is not attached. This may mean two things. It may mean that during a pain the placental site contracts less markedly than the rest of the uterine wall, or that it retains ultimately less of the contraction than the rest. In the former case we would, as Dr T. D. Slight has pointed out to me, expect a stretching of the placental site owing to the preponderating muscular action of the uterus apart from the placental site. There is no evidence of this, and Schroeder and Stratz' section of an early stage of labour shows undoubted diminution in the placental site. The second explanation seems to me more probable, and one that does not go beyond the anatomical facts. Professor Stephenson of Aberdeen has drawn attention to this inequality of section of

the wall in the third stage intact uteri in an interesting paper. He defines retraction as meaning "greater resistance to expansion" (p. 22), and believes that the layers of the muscular wall act differently, the external contracting and retracting regularly, the inner behaving irregularly (p. 24).

By the researches of Dawidoff especially, and of Poroschin, it has been shown that absence of the elastic tissue of the uterine wall is a factor in determining uterine rupture. Normally there exists a well-developed network of elastic tissue in uterine fundus and body, which surrounds the superficial muscles like an elastic sheath. In the puerperal uterus the fibres are better marked, and the lower uterine segment and cervix are richer in elastic tissue than the body and fundus.

I do not consider at present the effect of deficiency of this tissue in favouring uterine rupture, but merely point out that its reaction after the compression of the "pain" must aid in the recovery of muscle form.

The facts I have stated, and the newer ones brought forward, seem to me to strengthen the position I already took up, viz., that separation of the placenta takes place after, and not during a pain. The process of separation during the third stage of labour seems to me, therefore, to be effected as follows. We must first consider the effects of the "pains" on the placenta in the first and second stages of labour. The result of a pain in these stages is during the persistence to diminish the area of the placenta, to thicken it, and to thicken the uterine wall. This is undoubted. When the pain ceases, we get the uterine wall retaining part of its thickening and probably retaining less at the placental site. The placenta increases in area again, and diminishes its thickness. The placenta does not separate, as practically in these stages the wall and placenta behave as one. When the pain dies off, the fœtal and maternal circulation pass back into their channels, and with the elastic tissue reacting after compression, we get the "elastic recoil" after a pain by which the uterus tends to resume its old form. The placenta does not separate. To effect separation, *i.e.*, to tear the filaments at the spongy layer connecting the placenta to the uterine wall, or, in other words, connecting the placental site (uterine) with the uterine surface of the placenta as seen

after delivery, we require a disproportion. So long as placental site and placental area are equivalent in area, separation cannot happen. For separation, diminution in the placental site is not requisite in itself, but because it permits of an after disproportion. A very slight disproportion is necessary, as the filaments are miscroscopic, and easily tear under such a condition. This disproportion does not happen in the first and second stages of labour, as uterus and placenta behave as one.

During the third stage we get "pains" as usual, and we may now trace their effect. The first pain, for example, will compress the placenta and diminish it in area. The placental area and its uterine site are, however, equivalent, and the muscular wall thickened. When the stimulus causing the pain ceases, we get the "elastic recoil" after the pain due to the elastic tissue asserting itself after compression, and to the passage back in part of the maternal circulation into the uterine wall. Thus the placental site increases, but is not followed up by the placenta, as the influence of the fœtal heart has been cut off and we thus get the necessary disproportion of separation, and the placenta separates in part. Repetition of the pains and the elastic recoil complete the separation of placenta and membranes, and finally, the uterus expels the membranes and placenta either with the placental edge presenting (Duncan), or the amniotic surface first (Schultze). What I have termed "elastic recoil" has usually been spoken of by the obstetrician as "relaxation" and regarded as favouring hæmorrhage. It does not, unless excessive, as we all know that after a pain the uterus softens and yet bleeding need not occur.

When this elastic recoil occurs, there is really a gliding of the internal surface of the uterine walls and no separation of the walls. It has been argued that there is not sufficient energy during the elastic recoil to separate the placenta; but when we remember how easily these filaments are torn through in the early stages of placenta prævia, when only insignificant pains are present, this difficulty disappears.

The Porro uteri seem to me definitely to determine one thing, viz., that diminution of the placental site does not separate

the placenta. Porro uteri are over-retracted uteri, and yet the placenta is usually attached (Fig. 3).

There have been four great methods of treatment of the third stage of labour — traction on the cord, the Dublin method, the Credé method, and the expectant plan. Although I give the fourth method the last place, it does not follow that it is a recent method, as Wm. Hunter advocated it. I consider these methods only as far as separation is concerned. Separation is the great thing to clear up. Expulsion of a separated placenta is easily understood.

Fig. 3.—Porro uterus—placenta separated in part.

Traction on the cord is now abandoned, and rightly so.

So far as I have read the directions of the eminent Irish obstetricians concerned in the development of the Dublin procedure, Dease (1783), Collins (1835), M'Lintock (1848), and others, I have been impressed with the fact that pressure on the uterus is not recommended to be applied until some time has elapsed, and in this fact lies its safety and efficiency.

The original Credé method recommended expression to be begun immediately after the birth of the child. Herein lies its danger. Expression to separate the placenta is bad; to expel the placenta when separated, it is admirable.

I therefore advise the well-known expectant plan in the normal third stage, viz., that the attendant keep his hand on the uterus and allow it to separate the placenta during its elastic recoil, and that expression should only be used to expel the separated placenta, the separation usually occurring in from twenty to forty-five minutes. I need not give fuller details, as I have already indicated these in previous papers. I wish to urge, however, that all unnecessary manipulation of the uterus should be avoided, so as to ensure that it is not exhausted, and thus made inert.

I may now finally sum up my views as follows:—

1. The Porro uterus is an over-retracted uterus, and does not indicate the amount of retraction of the normal third stage uterus during retraction.

2. The "intact uterus" is not so markedly retracted as the Porro uterus at the site of the unseparated placenta, and gives a more reliable indication of the amount of retraction under normal third stage conditions.

3. Retraction of the uterus is most marked in the parturient uterus where the membranes are attached; above the site of uterine rupture, and in the *post-partum* uterus. Placenta and membranes attachment hinder full retraction.

4. The placenta is separated in the third stage during the elastic recoil of the uterus following a pain, and not during a pain.

5. No uterine pressure can separate the placenta directly with safety.

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The Chairman said that Dr Hart had raised in his paper one of the most important subjects in the whole range of obstetrics, although it was apparent that he held views diametrically opposed to the great mass of practitioners.

Dr Haultain said that like the majority of people he accepted the view of the contraction and diminution of area as being the cause of separation. He could not exactly see how it could be otherwise. He endorsed what Dr Berry Hart had said as regarded the management of the third stage of labour. The old Credé method—expression from the interior of the uterus—was a most objectionable proceeding; and the method of leaving the placenta to be driven from the uterus by the unaided contraction of its walls and its subsequent artificial expulsion from the vagina, was the method that should be recommended and followed.

Dr James Ritchie said he had frequently noticed in the third stage of labour that there was no escape of blood from the vagina during a pain, but that during relaxation there was a flow of fluid. He had never been able to account for that. If, as Dr Hart thought, there was partial separation of the placenta during the time of retraction of the uterus, this would account for the opening of some of the vessels and an escape of blood at that time.

Dr Foulis said the subject was a very large one. He was very much struck with the entire absence of the word contraction from Dr Hart's paper. He did not think the word occurred once. Two pieces of matter could not occupy the same place at the same time. That was a physical impossibility. They were perfectly agreed that with a very big uterus extend-

ing up to the ensiform cartilage they had a gradual diminution of that big mass as it got rid of its contents. How did it get rid of its water and fœtus? By squeezing upon its contents and throwing them off, because two pieces of matter could not occupy the same place at the same time. Then they came to a point where the uterus did not contain either its water or the fœtus. The placenta which was a part of the fœtus remained, and they had to get rid of that. Now, one of the great dangers was hæmorrhage. What was the meaning of hæmorrhage in connection with the third stage of labour? He knew of nothing more beautiful in the whole of physiology than the teaching of Lister with regard to coagulation of the blood. He taught that when blood was in the living vessels it never coagulated, but that when it came in contact with dead or dying matter, or torn tissues, it began to clot; and so they had a stage in a perfectly physiological process, after the expulsion of the fœtus, where the uterine contractions, in trying to expel the placenta, caused a partial tearing away of the mucous membrane of the uterus, and coagulation of the blood took place not only in the torn uterine tissue but in the placenta also. As long as firm clots occupied the sinuses there was no hæmorrhage, but the same circulation that was going on through the body of the uterus, before the fœtus was expelled, was still trying to pass through the great vascular channels of the uterus after the expulsion of the child. When the uterus contracted, there was an effort of the uterus to throw off the placenta by a process of contraction. He did not know that any one present had in the smallest degree understood the meaning of the word retraction used so frequently by Dr Hart. Let him think of what retraction meant in connection with the uterus. Dr Hart used the word recoil over and over again. Could the uterus retract from the placental surface when the vagina was closed? Could a vacuum take place between the surface of the placenta and the uterine wall? That was an impossibility. Could the uterus by any inherent properties in its muscular tissues exert enough force to draw itself backward and away from the placenta? Nobody had demonstrated anything of the kind. The whole process of expulsion of the placenta was the active contractile force of the uterus trying to get rid of a foreign body. The

practical portion of the paper—the management of the third stage in regard to hæmorrhage — was the important one. Nothing had struck him so much as this, and Dr Ritchie had referred to it. Hæmorrhage did not take place during the first contraction—when they held a hand on the uterus they often found the uterus enlarging. There was then no hæmorrhage; perhaps Dr Hart called it retraction, but he held it was the vascular force from the heart which caused the uterus thus to swell up. Suddenly they found the uterus contracting, and this was followed often by a great gush of blood; after that the uterus usually swelled up again. He had seen this over and over again. The uterus swelled up not because of its inherent power of recoil or elasticity, but because the vascular channels in it were distended by the pumping action of the heart till the uterus was stimulated, and then a violent contraction went on. If they kept up that contraction till clotting took place in the sinus and mouths of the sinuses, they would not likely have it swelling again. It was at this stage that the use of ergot proved so valuable in keeping up that contracted condition of the uterus after it got rid of the placenta. In the management of the third stage they must keep the patient at perfect rest for a considerable time after the expulsion of the placenta, for this reason, that any muscular effort on the part of the patient was apt to cause the uterus to swell up considerably. There was one case he would never forget, where the lady was delivered under chloroform, and everything went on beautifully. As she came out of the chloroform she took a fit. The uterus was closed at the time, but in a few seconds, as she became opisthotonic, every muscle became rigid, every vein compressed, and the uterus swelled up in a great mass; and then there was one of these violent contractions, and the uterus emptied its blood, and all the clots were driven out, and no power could stop it. He used his hand to keep it down, and gave a large dose of ergot. He also administered chloroform for the fit. The lady recovered after months of illness. He had not heard a word in the paper that would drive him from the solemn conviction of the necessity of bearing in mind the vascular supply of the uterus. This was the important matter in the third stage. If they kept the uterus quiet and contracted till coagulation took

place they would have no further danger of hæmorrhage, unless, indeed, they allowed the nurse to order the patient to raise up her body while she put on the binder. By raising her body there was often a pressure of the muscles on the surface of the body, so that the very clots were often driven out and hæmorrhage took place. There should be perfect quiet and rest for a considerable time after the expulsion of the placenta. Until Dr Hart demonstrated at the bedside that the uterus could draw itself off the placenta—for he could think of no other meaning of retraction—he preferred to follow the old teaching of contraction of the uterus from beginning to end.

Dr Ritchie explained that the remarks he made did not apply to such cases as had been described by Dr Foulis, but rather to a case in which there was some slow separation of the placenta without any great loss of blood—the total loss perhaps a few teaspoonfuls. He advocated the placing of the hand over the uterus with the view of preventing it being filled with blood through the pumping in of the general circulation, but without pressing it. He had noticed again and again, felt the pain, noticed the vulva until the placenta was discharged. Not a drop of blood had come away, but then after the pain, when he felt the uterus was really what Dr Hart described as retracting, he noticed a little blood rush away. He had noticed that in half a dozen or more pains during the time of the separation of the placenta without any great loss of blood. If Dr Hart's explanation of it was the correct one, he could the better understand why there should be that slight amount of hæmorrhage during that particular time, and not during the time of the uterine contraction.

Dr J. W. Ballantyne said that sometimes they forgot that after all, during pregnancy, labour, and the third stage of labour, their duty was to be prepared for emergencies. They did not go to every third stage with the idea that it would end in hæmorrhage. They did not expect things to go wrong in the third stage in every case; but they went to a confinement to be, as it were, ready with the hand or in any other way to prevent danger arising. The view he had been led to take of the third stage of labour was simply to be there in waiting watchfulness, so to speak, for anything that might go wrong.

Unless he found himself in presence of danger from hæmorrhage he had very much allowed the uterus to retract and expand within reasonable limits, keeping his hand on it. Where there was hæmorrhage he certainly compressed the uterus. He felt the danger of Dr Hart's teaching (or rather the danger of the idea that might be erroneously taken up from his theory) of allowing the uterus to expand beyond a reasonable limit. The idea of expansion of the uterus separating the placenta seemed to convey to his mind danger in the case of any one who had not grasped the significance of the whole phenomenon. At the same time he did not see why the placenta should not be separated by diminution and enlargement of the uterus occurring alternately. Dr Barbour in his recent writings had added something to the old view of simple separation by diminution in placental site, viz., *detrusion*. He said that diminution of site was not sufficient, and that one must include also the idea of detrusion, as when a fibroid was separated. At the same time, as Dr Hart himself had said, if the woman was waiting in the third stage until they settled how the placenta was separated, she would be in a bad plight. After all, the main thing was not to separate the placenta, but to see that it and all the membranes were completely expelled in the third stage of labour.

Dr Fordyce regretted that the previous speakers had not taken up the new points raised in Dr Hart's present paper. He did not agree with Dr Hart's conclusion arrived at from the sections and drawings he had exhibited, but thought that if they proved anything it was that retraction and contraction separated the placenta, because, where the uterine wall was retracted and thickened, the placenta was separated, and on the other hand, where this retraction had not taken place the placenta was still adherent.

Dr Nicholson thought the remarks which had fallen from Dr Foulis with regard to the third stage were almost in entire agreement with the experience of most practitioners. He was of opinion that the conduct of that stage by the practitioner had very little bearing upon the occurrence of the dangerous type of *post-partum* hæmorrhage. This kind of bleeding was dependent on general conditions of the circulation. One could

often get an indication from the state of the pulse whether the patient would bleed much. He knew practitioners who forcibly removed the placenta immediately after the birth of the child, and others who invariably allowed it to come away itself without ever putting a hand on the mother's abdomen. Both these methods, so far as *post-partum* hæmorrhage was concerned, were quite as successful as the Dublin method. Therefore he believed severe hæmorrhage to depend upon the general conditions of the patient and of her circulation at the time of labour. It was often beyond the power of the practitioner to control these factors. On this view, compression of the abdominal aorta, to shut off a too forcible contraction of the left ventricle from the uterine vessels, was rational and proper treatment, and he had always been accustomed to rely primarily on this method of arresting the hæmorrhage. He had listened with much interest to Dr Hart's remarks on the mode of separation of the placenta, but would advocate the above treatment in all cases of serious *post-partum* bleeding.

The President thought that the great difficulty surrounding this very important subject, and which bore especially upon his management of the third stage, was that of distinguishing between the meaning of the terms "retraction" and "contraction." They were all clear enough as to what they understood by contraction of voluntary or involuntary muscle, but he had never satisfied himself that he had conveyed to his students any very clear idea of what "retraction" was, probably because he had no very clear idea of it himself. That there was such a physiological phenomenon as retraction they were all agreed, but at the same time it was something characteristic of the uterus, and among all the hollow viscera, it alone manifested it. It was impossible to demonstrate its existence in such an organ as the stomach or bladder. Dr Hart had not given any definition of what he meant by this term, nor had he explained what was its physiological nature, yet it was, so far as he (the President) could follow him, during the process of retraction that Dr Hart found the force which caused the separation of the placenta. In his paper, moreover, Dr Hart more than once used the word "recoil" as being descriptive of the process of retraction, or of what

occurred during it, and it seemed to him that this was a most unfortunate word to use. It implied that the uterus, after contracting, had a sufficient spring in it to cause a separation which the contraction had failed to effect, and he could not see how that was possible in an organ built up as the uterus was. This was to his mind the weak point in Dr Hart's theory, and which rendered its acceptance impossible to his mind. At the same time he ventured to enter a word against Dr Foulis's interpretation of Dr Hart's theory. In his remarks Dr Foulis implied that Dr Hart assumed that the uterus in some way sprang away from its contents. That was certainly not what Dr Hart meant. Both during contraction and retraction the uterus maintained its primary shape and fitted closely round its contents.

Dr Foulis asked where retraction came in now. He understood all the President had said up to the present. Was retraction not a drawing back?

Dr Hart—No.

The President said that Dr Hart would doubtless deal with that. He was not to attempt to give a physiological explanation of retraction, because, as he had already said, he could not do so. But in any view of its nature which had been advanced he could never understand that a force sufficient to separate the placenta could be produced by it. At the same time as regards management, every one agreed with Dr Hart that there should be no attempt to detach the placenta by pressure applied externally, in the way which was at one time only too common. Watchful, expectant attitude, constituted the ideal management of the third stage.

Dr Hart said the discussion of the third stage of labour seemed to retain its perennial power of stirring members to eloquence. He had not taken up the whole question of the mechanism of the separation of the placenta, as he had considered that already. The tying of the cord, for instance, was not a question of fluid in the placenta, but circulation in the fœtus. However, the point he wanted to discuss was this—were they to accept the Porro utèri as normal or abnormal? Nobody had answered that question at all. That was the whole thing on which the point hinged. If they took it

as normal they had marked diminution of site normally; if they took it as abnormal they gave up the marked diminution for normal.

The President said it was not possible to discuss that at so late an hour. At the same time he thought the moment they got the uterus out of the body they had conditions not physiological at all. The uterus had lost its power of retraction and contraction, and was a mass of dead material.

Dr Hart—You agree with me then that we could not take Porro uteri as evidence?

The President—Yes.

Dr Hart said his view was that the placenta separated itself by a sliding motion—the placenta and uterine walls sliding on each other. He had defined retraction in a modern sense. Retraction implied contraction. He never used the word contraction, as when he said the uterus retracted it implied contraction. It was peculiar in this, that after the stimulus which caused the uterine muscle to thicken, the muscle retained part of the thickening, and that was what retraction was. Great confusion had been caused by men thinking that retraction was "taking up." But that was not what he meant. It was a contraction where, after the stimulus was over, the thickening of the muscle was retained. The points that interested him related to the Porro uteri. He believed the Porro uteri could not be accepted as normal. On measuring sections of all the third stage uteri he found the placental site was much less thickened than they had been in the habit of thinking, so it seemed that thickening was much diminished where the placenta was attached. As to the elastic recoil—the placental site diminished during a pain, then after the pain was over its area increased. This was due to the elastic recoil.

MEETING IV.—FEBRUARY 13, 1901.

DR MILNE MURRAY, *President, in the Chair.*

I. The following were elected Ordinary Fellows of the Society:—Jessie M. Macgregor, M.D., 8 Walker Street, Edinburgh; Hilda M. M'Farlane, L.R.C.P. & S.E., Northumberland County Asylum; George Dickson, M.D., 14 Ardmillan Terrace, Edinburgh.

II. *Dr Haultain* showed—(*a*) a LARGE ŒDEMATOUS FIBROID removed by abdominal hysterectomy; (*b*) DOUBLE DERMOID OVARIAN TUMOURS, one associated with supernumerary ossium of Fallopian tube.

III. *Dr Brewis* showed—(*a*) a UTERUS removed by vaginal hysterectomy for cancer of the body; (*b*) THREE FIBROID TUMOURS removed by abdominal hysterectomy.

IV. *Dr Michael Dewar* showed TWO HODGE PESSARIES which had undergone an unusual change in shape in the vagina.

V. *Dr Haig Ferguson* exhibited—(*a*) a PHOTOGRAPH of the abdomen of a primipara, aged 23, at full time pregnancy, showing displacement of the sigmoid flexure of the colon in front of the uterus (see plate). Spiegelberg speaks of this condition as being a very rare one. Dr Ferguson found in this case that on inspection the appearance varied from day to day. Sometimes, when the sigmoid was full of flatus, a distinct rounded swelling, like an ovarian cyst, was visible in front of the uterus, but giving a tympanitic note. When the sigmoid was emptied of flatus this appearance was not so characteristic. The bowel could be pushed to the left side, but, on the patient lying round on her right side, the sigmoid again slipped in front of the uterus and remained in that position. The condition is interesting on account of its rarity, and also from the fact that in a Cæsarean section it would be well to keep in mind the possibility of such a displacement of the gut.

S. S. Sigmoid Flexure lying in front of full-time pregnant uterus.

[*To face page* 94.

(*b*) A LARGE CYSTIC KIDNEY which he had removed by abdominal section from a young lady aged 22. The physical signs were, in some ways, not unlike those of an ovarian tumour. The fluctuating swelling, about the size of a fœtal head, could be distinctly made out over the pelvic brim and mapped out bimanually. It could also be pushed up towards the right lumbar region and across the abdomen. Dr Ferguson diagnosed a cystic kidney mainly from the fact that the colon lay in front of it. There were no urinary symptoms of any kind. The patient had complained of pain in her right side off and on for about 8 years. She first noticed the swelling in October 1899, since when it had increased in size, and she was constantly suffering from recurring attacks of pain and sickness. Dr Ferguson opened the abdomen through the right linea semilunaris, passed his hand into the abdomen, and palpated the other kidney, which was found to be normal. The ascending colon was then pulled over towards the left side, the posterior layer of peritoneum torn through, and the kidney easily removed. The ureter was quite healthy. Before sewing up the abdominal wound, a counter-opening was made posteriorly in the right loin, through which a drainage tube was inserted. The patient made an uninterrupted recovery, her temperature never reaching 100° F. Her urinary secretion was scanty for the first few days of the operation, varying from 20 to 30 ounces in the 24 hours; afterwards it became absolutely normal. The case is interesting as showing how closely a cystic kidney may resemble an ovarian tumour in its physical signs. The pathological report of the kidney does not fall to be discussed here.

VI. *Professor Simpson* showed—(*a*) OVARIAN FIBROMA. Patient, Mrs MacD., æt. 60, xii.-para. *Complaint:* Pain in right side and lower part of abdomen for 2 years; much more severe during last 8 or 9 months. Has only noticed swelling in abdomen for about 9 months. Pain on micturition for past 3 or 4 years, pain on defæcation intermittently. Leucorrhœa since menopause 10 years ago. *Physical Examination:* Abdomen: walls very thick, fairly lax, no tenderness on pressure. A hard oval-shaped body is felt coming up from the pelvis and reaching up to the umbilicus; it is slightly mobile

and not sensitive. Bimanually through the anterior fornix a firm rounded body is felt continuous with the abdominal tumour; the tumour is slightly mobile, and is about the size of a 4-5 months pregnancy. Some irregular nodules are indistinctly felt on the right of the tumour. *December* 12: The abdomen was opened and found to contain some clear yellow fluid. The tumour was drawn up to wound with a corkscrew. Numerous very troublesome adhesions. Pedicle, a mere thread, was ligatured and torn through. Some adhesions were ligatured, some rubbed off with swab. *Result:* Uninterrupted recovery, went home quite well on January 9.

(*b*) DOUBLE OVARIAN CARCINOMA. B. L., unmarried, nullipara, æt. 26. *Complaint:* Pain in right side of abdomen. Irregular and excessive menstruation. In May 1900, patient was in hospital and was treated with glycerine and ichthyol tampons and hot douching. She improved under this treatment and returned home, where the same treatment was continued. For four months she had amenorrhœa, during which time the pain in the right side was more severe. For three months before returning to hospital she has had severe menorrhagia, the flow lasting 14 days at a time and returning in 10-14 days. The pain is always more severe just after flow has ceased. *Physical Examination:* The uterus felt to front is very sensitive and slightly enlarged. To the right of the uterus a firm, tender body is felt, which on bimanual feels about as large as a hen's egg. The left ovary is also enlarged. *December* 22: Abdomen opened. Double ovariotomy performed. *Result:* Uninterrupted recovery. Microscopic examination showed ovary to be carcinomatous.

(*c*) DOUBLE OVARIAN CYSTOMA (one rupture). Mrs C., æt. 61, vii.-para. *Complaint:* Pain in abdomen, most marked on right side, swelling of abdomen for 5 or 6 months. *Physical Examination:* Abdominal wall thick and tense. A swelling is found rising from the pelvis and extending 3 or 4 ins. above the umbilicus. Swelling is of moderately firm consistence, but its outline cannot be well defined; it seems to extend to about 3 or 4 ins. on each side of the midline. Bimanually, tumour can be only imperfectly defined; it presses down the anterior and both lateral fornices, and feels of fairly

soft consistence. The uterus cannot be palpated distinct from the tumour. *January* 23: Abdomen opened. Cavity found to contain large quantity of jelly-like semi-solid substance found to be the contents of a ruptured cystic tumour of the right ovary. The left ovary was also replaced by a cystic tumour which was not ruptured. Double ovariotomy: Over ℥ 300 jelly-like substance from cysts. Five days after operation temperature ran to 103·4, cough, some dulness. On 8th day temperature normal; patient still some cough, but doing very well.

(*d*) TUBAL PREGNANCY. Mrs B., æt. 28, ii.-para. *Complaint:* Pain in left side and bleeding from the vagina for 3 weeks. Last child in May 1898. Labour difficult, some subsequent prolapse. Wore pessary for 6 months, which then began to cause pain and was removed. In September 1900 began to have constant loss of blood, flow continuous, but amount lost very small. It ceased after two months, but began in November and continued till admission to hospital on 24th December. Before September patient was quite regular but had some slight leucorrhœa. *Physical Examination:* Through left lateral fornix a cystic rounded body is felt, there is also some firm body in the pouch of Douglas. *December* 28: Abdomen opened. Left tube found to be much distended and lying slightly to the back; a large quantity of semi-organised blood-clot also found in the pouch of Douglas. Clots and left tube and ovary removed, uterus found to have some adhesions to the posterior pelvic wall. *Result:* Patient very restless for first 48 hours, morphia given three times. Subsequently made a most satisfactory recovery and returned home January 26.

VII. *Dr Keppie Paterson* showed a SPECIMEN OF HYDRAMNIOS OF THE OVUM. The patient, a primipara, had suffered more than ordinarily from the vomiting of pregnancy. At between 2½ and 3 months she miscarried, the amnion being passed entire and alone, while the desidua were expelled a few days afterwards. The specimen was twice or thrice the size of an ovum of that period. The fœtus could be seen closely attached to the amnion, and evidently of not more than 3 weeks' development. As the uterus did not show any appreciable enlargement on

examination at the 5th week, the amnion must have continued its secretion after that time. This specimen showed that the liquor amnii is not dependent on the life of the fœtus for its formation.

VIII. PSYCHOSES FOLLOWING PELVI-ABDOMINAL OPERATIONS.

By J. Halliday Croom, M.D., F.R.C.S.Ed., F.R.C.P.Ed., Consulting Physician, Royal Maternity Hospital; Gynæcologist, Royal Infirmary, Edinburgh.

There is no novelty whatever in discussing the question of mental disturbances succeeding operations of all kinds. There is scarcely any form of operation which, in persons so predisposed, may not lead to a total upset in the nervous system, and bring on psychical changes more or less marked. Such aberrations occur after operations in general surgery, even after such a minor accident as a simple fracture. After the administration of anæsthetics, delirious mania has followed, and in some cases weakmindedness has lasted for a very variable period. Abdominal and pelvic surgery is no exception, of which the cases to which I am about to refer are sufficient indication. The normal functions of the uterus and ovaries are themselves not unassociated with mental aberrations; alterations in the temper, for instance, or actual hallucinations, disordered appetites of all kinds, are accompaniments both of menstruation and pregnancy. The same is the case with the menopause. That of course is a natural process, and yet is only too frequently associated with all sorts of forms of nervous and mental disturbance. Perhaps of the three conditions—menstruation, pregnancy, and the menopause—the menopause is more frequently associated with curious mental phenomena than any other period of a woman's life. Such aberrations are associated with the normal utero-ovarian conditions.

Every one is acquainted with the frequency of insanity occurring after ordinary labour, of which the asylum records bear ample testimony, but it must be admitted that puerperal insanity generally occurs in those in which the patient's record

has not been a clean one, where there has been insanity or mental weakness, either in the case of the patient herself previously, or in her parents, or in the collateral branches of the family. Of course I am not concerned with the question as to the advisability or propriety of operating upon mentally diseased women, or women with neurotic inheritance. The prognosis in such cases is serious. The tendency to rouse up morbid mental tendencies in such people by operations is, of course, very serious, and therefore in such women operations of convenience, which are not necessary for the prolongation of life, ought to be undertaken very guardedly indeed. Before going further, let me give an illustration of a case of mental disturbance, associated with menstruation, in an otherwise healthy woman with a good history, unassociated with any operative interference whatever.

CASE I.—The patient was a young unmarried girl, æt. 26, and the complaint was, that she had for long exhibited symptoms of violent dislike to her relatives, especially her brothers and sisters, during the five days that her catamenia lasted. She was morose during the whole period, declined to speak to any member of the family, and was violently insulting when spoken to; but the day after her catamenia ceased she was bright, cheerful, and well, and willing to enjoy all the pleasures of life. This had lasted for ten years. She has been on more than one occasion examined carefully under chloroform, and no morbid condition whatever could be found in the uterus and annexa. She had no dysmenorrhœa. Her sisters are all healthy and well, and there is, so far as could be ascertained, no history of any insanity in the family. This case seems to be one in which there must be some peculiar idiosyncrasy in the patient, which is associated with nothing apparently abnormal in the pelvis, with no displacement, neoplasm, or lesion in either the uterus or its appendages. But the interesting point of the case is, that she married two years ago, and shortly after marriage she became pregnant, and was delivered at full time, but during the whole period of her pregnancy she had exhibited symptoms similar to those she showed during menstruation, but shortly after delivery she became perfectly

well, and has remained well since, though menstruating regularly.

It is unnecessary here to refer to mental conditions during normal pregnancy; they are very well known and recognised, and one would pass from these which might well be called "normal neuroses," to those which are associated with pelvic or abdominal operations.

The following case is interesting, inasmuch as one cannot imagine any class of case that is so disappointing to an operator as this, in which the whole advantage and benefit of the operation is destroyed and misunderstood, on account of this mental distress.

CASE II.—A young woman, a widow, æt. 32, was admitted into a nursing-home—under my charge—suffering from villous endometritis, with profuse hæmorrhage, not only at her menstrual periods but intermenstrually as well. On examination, the uterus was found much enlarged and easily hæmorrhagic. The obvious treatment was to perform curettage. This was accordingly done, and the patient made an excellent recovery. Some weeks afterwards she took an inordinate dislike to her own child, threatened to murder it, and she is now an inmate of an asylum.

Here again is a distinctly disappointing *result*. In this case the diagnosis was obvious, and the cure absolutely complete, and yet the case ended more disastrously than if the patient had died of acute sepsis. Such a case impresses one with the importance of regarding in their estimate of the danger of an operation the fact that it may be followed by mental changes as serious as the one just referred to.

The following is another case of mental trouble consequent upon a minor gynæcological operation:—

CASE III.—The patient in this instance, a young lady, æt. 25, was brought to me *reduced to a state of extreme anæmia*, suffering from constant and profuse uterine hæmorrhage, dependent upon the presence of a uterine polypus. This is

not the place to discuss the nature of the operation necessary, but it will be allowed that the removal of a tumour such as this, about the size of a hen's egg, involves no very great shock to the system. Such operations are performed every day, and are, so far as either immediate or remote results are concerned, entirely satisfactory. Of course the hæmorrhage ceases at once, and the only possible risk is septic absorption, and this can be easily prevented. This lady made an extremely good recovery, and left the home perfectly well. There has been no return of the hæmorrhage since. Unfortunately, two months after the operation, she harboured the delusion that she had been delivered of a child, and that she had become, as a result, an outcast, and she is now the inmate of an asylum.

This is a result which no one can discount, and cases such as this, where the patient was reduced to a state of profound anæmia, and where the physical cure was an absolutely complete one, are, it must be admitted, a disappointment. So far as one could discover, this girl had no family history of insanity whatever, either in her immediate family or among her relatives, and this is the point one would emphasise. It may be readily understood how the extraction of a tooth or the administration of chloroform would upset the nervous system of a person pronouncedly so predisposed, but this is a case where there was no tendency to insanity in the family whatever. I repeat that this fact seems to be a very serious addition to one's views as to the prognosis of any case. As has just been said, all are prepared to discount accidents in insane families, but one has no right to discount—one is not expected to discount—such accidents as these in women who have a perfectly clean mental history. It might be possible to account for this case by the fact that the girl was reduced to profound anæmia. She was exsanguine in the extreme, and therefore it is possible that an operation undertaken under such circumstances might have produced a comparatively great shock, but then the symptoms did not come on for at least two months after the operation was performed, and by that time the patient had become physically

stronger in every way. At the same time, when one regards the curious mental and physical phenomena that are from time to time seen in conditions—perfectly normal conditions—such as menstruation, pregnancy, lactation, and menopause, it is not a matter for very great surprise that when, in addition, operative interference is had recourse to, the effect on the nervous system should be pronounced, as in the case just recorded. It might be supposed that the insanity occurring two months after the operation was neither in consequence of it nor related to it, but the nature of her delusion is a sufficient answer to this objection.

The influence which the ovaries and uterus exert over the mind has long been discussed in the abstract, and on that account one is all the more anxious to record concrete examples illustrative of these conditions, in order that others may be prepared for them as they occur. It is not for me to inquire into why this takes place, nor to go into any erudite examination of the relation between mind and matter; it is enough to point out that such accidents are possible, and at the same time, unfortunately, utterly and absolutely unpreventable.

Before leaving the subject of minor gynæcology, one other case might be quoted.

CASE IV.—The patient, a young woman of an exceedingly healthy family, suffered from intense spasmodic dysmenorrhœa, which had resisted all the ordinary drugs, and which was so severe as to withdraw the girl from active duties every month. On one occasion her suffering was so severe that she had to have chloroform administered. After due consultation with her friends, the cervix was dilated, and for the two succeeding months she was quite free from her dysmenorrhœa; but at the third month it returned, and she became violently maniacal, and her mental equilibrium has been very much upset ever since, so much so that her marriage has had to be abandoned.

It is unnecessary to multiply cases of mental changes following minor operations, but one could mention others, though fortunately less pronounced and attended with happier

results than those just cited. Though *I have not myself* seen any cases of insanity after perineal repair, yet Kelly records six cases of insanity after perineal operations, and one of these died in acute mania.

When one comes to pass from minor to major operations, of course the field is wider, and in the following example it will be found that mental and fatal conditions are by no means unassociated with the major operations in gynæcology. The case is as follows:—

CASE V.—The patient was a married woman, apparently in robust health, with a simple ovarian tumour. There were no adhesions and no difficulty whatever in the operation, which lasted ten minutes. It went off without a hitch of any description, and the prognosis was therefore perfectly favourable. To show how careful one ought to be, I might mention that, after the operation was over, the husband asked if there was any necessity for him to remain in Edinburgh. The answer was in the negative; he was told that his wife was perfectly well, and there was no likelihood of any hitch occurring, and he left for a distant part of the country. The following day the patient became acutely maniacal, had to be held down in bed, and died of exhaustion in four days.

Of course it will probably be said that this was the mania or the delirium of sepsis, but, as a matter of fact, the autopsy showed not a trace of sepsis anywhere. The patient had no family history of insanity, and was apparently in excellent health. Here, again, one does not wish to enter upon any abstruse investigation as to how this calamity occurred, but the fact remains that the patient died in acute anæmia four days after the simplest possible operation. Reference might here be made to the excellent paper by Kelly on this subject, in which he records eight cases out of something over 2000 abdominal sections. The record from which these cases are taken shows five cases of insanity in over a thousand sections. Of Kelly's eight cases five recovered completely, two remained insane, and one

committed suicide. My record obviously is not so satisfactory.

The case just referred to is one of acute mania, following a simple operation. Take another case:—

CASE VI.—The patient had a rather troublesome ovariotomy performed. There were numerous adhesions, but the case, though somewhat tedious, was nothing unusual. She made an excellent recovery, and remained absolutely well for five days. On the morning of the seventh day, when the stitches were removed, the wound had completely healed except for one small suppurating stitch hole. The same evening she became excited. The next day she was still more so, and a day later she became acutely maniacal, and remained so for a week, when she had to be removed from the home. She died shortly afterwards.

CASE VII.—Perhaps one of the most painful cases was that of a patient upon whom I performed hysterectomy for a large rapidly growing fibroid. It is unnecessary to mention the operative details; suffice it to say that the stump was treated intraperitoneally, and dropped back into the abdomen. The tumour was a large one, involving a wound nearly from the ensiform cartilage to the pubis. Afterwards she was apparently well, without any notable rise of pulse or temperature. On the night of the seventh day, after the stitches had been removed, while the nurse had left the patient just for a minute, the patient jumped out of bed, tore off the dressing, and before she could be brought back to bed the strapping had given way. This allowed the wound to reopen at its lower margin, and a small portion of the gut escaped. I saw her very shortly afterwards, and found her in a state of violent excitement. It was with difficulty that she was anæsthetised. I was fortunately able to deal with the temporary hernia, and she recovered from the operation, but only to become an inmate of an asylum, where she still is.

These cases all illustrate mental disturbances occurring immediately after an operation.

CASE VIII.—The next one is a case of melancholia, which supervened six months after the performance of a simple ovariotomy. The case was a perfectly easy one, without any complications. The patient made an excellent recovery, but six months afterwards began to show symptoms of dislike to her friends, along with evidences of suspicion and melancholy, and she is now, and has been for some time, confined in an asylum.

The interesting feature of all these cases is, that all those mental disturbances occurred after operations which were uncomplicated and simple, and in cases where the operation *per se* was entirely successful; and further, that all occurred in women who, so far as could be traced, had no hereditary tendency whatever in that direction. There is little reason to doubt that septic infection has a great deal to do in the production of insanity after operations.

Of course, in looking for causes that lead to these mental disturbances after operation, the field is very wide.

Undoubtedly the first factor is the hereditary one; the second possibility is sepsis; and from these two, which are probably the main causes of post-operative insanity, one can look to a large group occurring under loss of blood, defective action of the kidneys, and so forth.

Again, one must remember that in removing the ovaries for disease (or from other cause) one induces the climacteric, and of course in so doing one places the woman in all the possible risks of climacteric trouble. It seems probable that the essential pre-requisite for the development of post-operative insanity must be, in all cases, a neurotic organisation, predisposed, from either hereditary taint or acquired nervous weakness (and instability), to take on diseased (or perverted) action, in consequence of any active disturbing influence.

Naturally, all are unwilling to admit that sepsis is the cause of death in operations, for now we know that a septic death means careless surgery, and therefore some are apt to attribute deaths and misfortunes to other causes than the real one. For example, death is said to be due to shock, defective kidney action, hæmorrhage, exhaustion from suffer-

ing, the depressing effect of anæsthetics, vomiting — to anything rather than to actual sepsis. Still, in the cases here referred to, with the exception of the hysterectomy, the possibilities of sepsis were out of the question altogether, at least of any sepsis that showed itself by any other way than by the insanity.

Alienists tell us that there does not exist a psychosis which may be called post-operative insanity. With the exception of certain operations on the head, thyroidectomy, etc., there are no operative procedures which can be said to be *solely* productive of mental troubles, and the main role in the production of post-operative disturbances is played by a predisposition, acquired or hereditary.

I think the remarkable thing, however, is that it has not been shown that insanity is more common after operations on the genital organs than after operations on any other organs. When one recognises the frequency with which mental troubles are apparently associated with the *normal* occurrence of changes—such as puberty, menstruation, pregnancy, and the menopause — it may be considered almost remarkable that women escape from these disorders as easily as they do.

One does not wish here and now to enter upon the great subject of operations undertaken in insane women, with a view to effecting a cure of the mental disease, by operative treatment of the genital organs. That is a field in which there is a good deal to be said, but it seems to me that under no circumstances ought any insane woman to be operated upon, unless for some distinct condition which is compromising life. The cases in which the ovaries have been removed, and other operations performed, with a view to influencing insane or hysterical conditions, are many, and I fear the results are exceedingly discouraging. One's own experience of hystero-epilepsy is comparatively limited. I have operated on only one case where the symptoms were extremely marked, and after the removal of the ovaries the catamenia ceased, and the hystero-epileptic symptoms disappeared; but after some years the patient was lost sight of, and therefore I cannot tell whether or not the cure was

absolutely complete. It is quite certain that after any degenerative processes have occurred in the brain cells, it is absolutely useless to look for any mental cure by any form of operations on the genital organs.

The relation of gynæcology to psychiatry has been much discussed in late years, and I think the general concensus of opinion, gathered from alienists and neurologists alike, is that, while it has a place amongst the insane just as among the sane for the relief of physical distress, yet as a great curative method in the treatment of insanity it plays a comparatively small and unimportant part.

The President said it was a matter of regret that Dr Croom was not present to read his paper, but a special vote of thanks was due to Dr Ferguson for the way he had read the paper at a moment's notice. The subject was one of great interest, and few of their fellows had the experience of Dr Croom with regard to it.

Professor Simpson said he thought that Dr Croom had made in this paper a very important contribution to an obscure subject. For his own part he had almost no experience whatever in this direction. He agreed with Dr Croom as to the inadvisability of accepting cures of epilepsy or insanity by removal of ovaries, for example, but he had no experience in the occurrence of insanity after operations. He did not recall one case of a patient becoming insane after an operation where there was not a quite distinct history of hereditary tendency. These cases of Dr Croom were quite inexplicable, and the value of the paper was that it called attention to the possibility of mental disease developing in persons where there was no reason to expect it.

Dr Berry Hart thought Dr Croom's paper of great interest and enabled one to recall similar cases. He had seen five cases where severe mental symptoms followed operation—three in minor operations; one of these was a perineorraphy. After the operation the patient became erotic and insane, and was sent to an asylum. The second minor case was after a curetting. It was an endometritis like Dr Croom's. He cured the patient completely, but she had been exceedingly anæmic.

In curetting they had sometimes hæmorrhage recurring, but one curetting in this case cured the patient so far as hæmorrhage was concerned. Sometime after she took peculiar mental symptoms, was cataleptic, but eventually recovered. The third case was an hospital case in 1897, and a year or two afterwards the patient wrote to him accusing him of having removed something, and threatening pains and penalties. He examined the Infirmary records and found that one day at the Clinique he had curetted the patient. She was marked cured. She was under the belief, however, that he had removed a child from her at the time of the operation. With reference to major operations he had seen in ovariotomy a violent attack of mania in an old woman, and in another case on the removal of the ovaries a young woman had a mental attack, but none of these conditions persisted. In none of them was there any sepsis, and they were not specially difficult cases, so he formed the opinion that there was some tendency to neuroses in them. He never thought of not operating in such.

Dr Haultain said his experience in regard to insanity was similar to Professor Simpson's. He had never a single case operated on which had become insane so far as he remembered. With regard to the first case Dr Croom spoke of, the patient who died four days after the operation was performed, he thought that seemed like the cases one read about of insanity of anæsthesia. He had some experience of the form of insanity that developed immediately after an operation in opium-eaters — particularly in the case of ovariotomy in which there was a great deal of pain. As they all knew, people who had been under the influence of morphia for years had a tendency towards mania of a very severe type when the habit was stopped, and death might even ensue. In one case of this kind where he had operated for ovarian distress the woman ran about the room and tried to do herself harm. For four or five days by vigilant watching the woman was kept quiet and ultimately got better. The question of morphia should, he thought, be kept in mind, because there were a great number of women who suffered from tubal disease of the appendages who had great pain,

and had in consequence taken morphia for a long time. Another point was the general statement that Dr Croom had made, that he would never under any circumstances operate on a patient suffering from mental disease simply for the disease, unless she had something tantamount to injuring her life. Now he could not say he should go so far as that. There were cases where one had seen women suffering from mental disease and gynæcological conditions, where the right treatment was to attempt to remove the gynæcological conditions, because reflexly or otherwise there was a reaction in the brain, and removal of these morbid symptoms set towards cure. They all knew that in the melancholia of pregnancy the best thing was to empty the uterus as soon as possible, thus removing the exciting cause, and giving the patient a better chance of cure. He had met with cases in which retroflexion of the uterus had been associated with a state of the utmost melancholia—these people were different individuals altogether. In these cases of mental weakness, where he found anything of a gynæcological nature that would tend to draw attention to these parts, his idea would be to remove them.

Dr Aitchison Robertson thought that many cases such as Dr Croom had narrated might have light thrown upon them by the more recent views regarding the pathology of nervous diseases. Many pathologists believed that most if not all nervous diseases were due to the toxines produced by certain micro-organisms. Indeed this had almost conclusively been proved in the case of certain of the more acute diseases affecting the nervous system, as infantile paralysis, acute mania, and general paralysis. It seemed by no means improbable that such affections would be more likely to supervene on operative procedures.

Dr James Ritchie believed that in certain individuals, specially the aged, there was a liability to mental derangement after chloroform or ether anæsthesia, apart from operation.

Dr Armour referred to the treatment by gynæcological means of a person suffering from mental disease. About two years ago, he said, he had a case of melancholia under

his charge. It was sent to an asylum. Shortly afterwards, the patient finding vague pains about the abdomen, abdominal examination was made, and a tumour found. This was operated on by Dr Fordyce, and turned out to be an ovarian cyst. It was removed, and the patient did well as regards operation; but not the slightest change occurred in the mental condition. Of course this was only interesting as contributing to the negative side of the question.

Dr Brewis said he thought with neurotic anæmic people the fact that they had to undergo an operation might in some cases afterwards affect the mental condition of the patients. In some of Dr Croom's cases he was not altogether clear as to whether the operation had anything whatever to do with the insane condition of the patient. It struck him that in all probability they might have become insane although there had been no operation. With regard to acute mania occurring immediately after an operation, he had always in these cases attributed it to acute sepsis, and even though the post-mortem examination did not reveal any signs of sepsis he did not think it disproved the fact of sepsis being present.

The Chairman said he was sorry Dr Croom was not present to reply to the various criticisms. Some points had been raised to which he might have had occasion to reply. He thought Dr Haultain rather misunderstood the point that Dr Croom had raised. Dr Croom referred rather to the cases where operations of a positive nature were performed in order to effect a cure in a given case of insanity.

IX. ON APPARENT LOW IMPLANTATION OF THE URETERIC OPENING.

By D. Berry Hart, M.D., etc.

(This paper appears at the end of this Volume of Transactions.)

X. A CASE OF UTERINE FIBROID WITH UNUSUAL SEQUEL.

By W. E. Fothergill, M.A., B.Sc., M.D., Assistant Physician Clinical Hospital for Women and Children, and Director Clinical Laboratory, Royal Infirmary, Manchester.

Mrs R., æt. 35, was married at the age of 21, but had never been pregnant. She enjoyed good health before the commencement of her present illness. Menstruation commenced at the age of 16; it was of the twenty-eight days' type, and was normal in every respect until it ceased at the age of 33. About the beginning of the year 1899 she noticed a swelling in the lower part of the abdomen, which grew steadily, but caused her no inconvenience until about six months later, when she failed rapidly in health and became unable to carry on her work as an artist. I saw her at the request of Dr Dearden of Manchester in August 1899, and we then found her to be suffering from pressure symptoms caused by a fibromyoma uteri, which was the size of a large cocoanut. It was quite symmetrical in shape, its lower portion occupied a position low down in the pelvis, and could be easily and completely traced by a finger in the vagina. The cervix was large and soft, but not patulous. The upper portion of the growth reached an inch above the umbilicus. It was not so hard as the lower portion, and we were satisfied that there was a central area near the fundus in which softening by cystic or other degeneration was going on. Operation was absolutely refused, and the patient remained in bed week after week. The growth increased gradually in size, and was at last almost as large as an eight months' pregnant uterus. Almost six months later Dr Dearden informed me that he suspected phthisis, as there were physical signs at both apices, she had a bad cough, and was greatly emaciated. An attendant who shared her apartment was suffering from advanced phthisis at the time.

At the end of April 1900 she was in about the same condition when the umbilicus, which had become swelled and inflamed, broke down and emitted a copious discharge of thin yellow pus, which continued to flow, its quantity being estimated

at at least a pint daily. I saw her with Dr Dearden when the discharge from the umbilicus had been going on for six weeks. The pus was not foul smelling, but had a strong disagreeable odour resembling that of the contents of sebaceous cysts. The abdomen was soft, and gave a clear note on percussion down to the umbilicus, but in the lower portion of the abdomen there remained the firm mass consisting of the lower portion of the fibroid. The patient was so thin that the condition could be mapped out very clearly on bimanual examination. The cervix and the portion of the tumour continuous with it were much higher up than before, and the pelvis was accordingly much more clear, the rectum and bladder being quite free from pressure. We at last persuaded the patient to go into the Clinical Hospital for Women and Children, where she was admitted on 25th June. I may mention that the house surgeon, on examining her, judged, as her doctor had previously done, that she was suffering from phthisis. (Her maid who had been sent to another hospital died, about this time, of acute general tuberculosis.)

On admission, the patient weighed five stone five and three-quarter pounds (her ordinary weight being about nine stone). On 26th June, under chloroform, a probe passed in at the navel descended half way to the pubes. The opening was enlarged and a considerable cavity was cleared out and packed with gauze. She was so ill that it was not thought desirable to interfere farther. There was very free discharge of pus, which continued unabated until 14th July. She was then no worse than on admission, and it was thought desirable by Dr Buckley and myself to make an attempt to remove the fibroid. We accordingly had her anæsthetised, and incised from the umbilicus down to the pubes. We found the whole anterior aspect of the tumour adherent to the abdominal wall. The lower portion of the growth had apparently become infected from the wound in the upper portion, for the whole mass was in a sloughing condition, and had the characteristic foul smell of putrefying matter. The interior of the mass was removed in handfuls until it became clear that nothing was left except a thin wall or capsule about one-eighth inch thick which appeared to be adherent to every organ with which it was in contact. On

passing a couple of fingers into the vagina, the cervix was recognised as a small mass the size of half a walnut. The cervical canal was not recognised, so a hole was made through the wall of the sac just to the left of the cervix, and a large rubber drainage tube was pushed through it, so that one end protruded at the vulva, the other at the abdominal wound. Gauze was then packed round the tube in the interior of the tumour, and the patient was sent back to bed. She soon began to improve, and the discharge, which escaped freely by the vaginal tube and by the wound, rapidly lessened in amount as the sac contracted. On 30th July the drainage tube was cut in half, and the vaginal portion was removed. On 10th August the tube was left out altogether, there being hardly any discharge. There was albumen in the urine at this time, but the lung symptoms were gone, as were the physical signs of pulmonary disease. On 23rd August the face was puffy, there was albumen in the urine, and the patient weighed only 5 st. 2 lb. The wound, however, was practically healed. She went home on 25th August. Her temperature was irregular all the time she was in hospital, but its variations were unimportant. I have heard from Dr Dearden (January 1901) that she continued to improve after leaving hospital, putting on flesh, and showing no further signs of renal or pulmonary disease. His present opinion is that she will completely recover her health. This case is mentioned as a curiosity, rather than because any special information can be gathered from it. The nature of the process which led to the adhesion of the tumour to the abdominal wall, and to the formation of the pus which flowed from the umbilicus, remains doubtful. It was not due to infection by streptococci and staphylococci, though these certainly gained entrance after the umbilical sinus was enlarged, and doubtless aided in completing the destruction of the tumour mass. I am inclined to think that the primary process was tubercular, judging from the nature of the pus, and the clinical facts which have been mentioned. Tubercle bacilli could not be demonstrated in the pus by staining, but this is a point of negative value, for in my experience it is very rarely that bacilli can be found in the pus from chronic tubercular lesions.

XI. A CASE OF PREGNANCY WITH OVARIAN CYST.

By W. E. Fothergill, M.A., B.Sc., M.D., Assistant Physician, Clinical Hospital for Women and Children, and Director, Clinical Laboratory, Royal Infirmary, Manchester.

On 6th July 1899, Mrs R., a tall, fairly stout and healthy-looking young woman, consulted me about an abdominal swelling which she had first noticed six months previously, and which had grown steadily in size. She gave the following history:—Her mother died at the age of 61, and one of her sisters died at the age of 35, both of them, she understood, of ovarian tumours. Neither of them was operated upon. Her own age was 35 years. Her health had been uniformly good. She had had three children, the youngest being three years old. Pregnancy, labour, and lactation had been normal each time. The menstrual function had always been normal. She had menstruated as usual in the month of April 1899, but had not done so subsequently. Apart from amenorrhœa, no symptom of pregnancy had been noticed; although in her previous gestations there had been morning sickness and tenderness of the breasts from an early date. Physical examination of the breasts gave no information. Inspection of the abdomen revealed a swelling the size of an eight months' pregnant uterus, occupying a central position. There was complete dulness on percussion; fluctuation was pronounced. Palpation above the umbilicus detected a solid body, suggesting a fœtal limb; while in the hypogastrium a solid mass was felt, which resembled in size and shape a fœtal head. Auscultation gave a negative result; and on using percussion with the patient in various positions, it became clear that there was no free fluid in the abdomen. *Per vaginam* the cervix was felt high up in the pelvis; it was soft and large. The os was not open, but was split on the right side. The body of the uterus could not be distinguished from the lower portion of the abdominal tumour, which could be felt through the vaginal fornices, and appeared to be solid on the right, but cystic on the left side. Bal-

lottement gave a negative result. The abdominal tumour was too tense to admit of satisfactory bimanual examination of the solid body which occupied the hypogastrium.

I was unable to exclude pregnancy, although amenorrhœa was the only symptom, and softening of the cervix the only sign. I therefore told the patient that she had a cystic tumour, and was also between two and three months pregnant. My proposition to remove the tumour was well received, and she went home to consult the doctor who had sent her to me with a view to operation. She resides some distance from Manchester.

On 27th July the doctor informed me by letter that his patient had fainted suddenly the previous day, and had been revived with difficulty. Such casual examination as her collapsed condition would allow, showed him that the bulk of the tumour had disappeared. On 30th July he wrote to say that the patient was passing blood and clots freely *per vaginam*, and was being carefully nursed till she should be fit for removal to a local hospital. I had the privilege of seeing her there on 10th August. She then had a high temperature, and was still bleeding, the discharge being very foul. The abdomen was flat; there was dulness in the hypogastrium and right flank. Palpation revealed the fundus uteri half way up to the umbilicus, while the dull area to the right of it was solid to the touch. *Per vaginam* the uterus was large and flabby, and occupied the middle line; the os admitted a finger tip, and an ill-defined solid mass was felt on the right, corresponding to the dull area of the abdomen. I understand that the uterus was thereafter emptied of placental débris and blood clot. She left the hospital on 20th August. I heard from the doctor later that his patient was up and about; though her temperature was not satisfactory and she had lost flesh. On 4th September he wrote that she was again in bed, with an irregular temperature. The cyst had filled up and was as large as ever, while the patient's condition was far from satisfactory. I saw her with him on 5th September, and found the physical signs just as on 6th July, except that the cervix was small and firm. We arranged to remove the cyst about a week later.

On 7th September the doctor wrote: "Mrs R. had a sharp

attack of inflammation connected with the cyst after you examined her. She suffered a considerable amount of pain yesterday, and was much collapsed. She has had a bad night with pain; abdomen more distended; pulse 100, running and weak; temperature 99·6°; face drawn. She seems much worse." On 8th September she was still worse, with a pulse rate of 140, temperature 102°, and constant vomiting. On 9th September I was wired for, and, catching an early train, found the patient apparently dying of acute peritonitis. The abdomen was distended with fluid, the temperature was falling, and the pulse was getting quicker and quicker.

We determined to operate. On opening the abdomen, after giving only a few whiffs of chloroform, a large quantity of slightly purulent fluid escaped, and the cyst came into view. It was quickly emptied of its contents (which consisted of clear fluid), and drawn out through the wound, the only adhesions present being very recent. The pedicle was secured, and, on cutting through it, a gush of pus escaped from the Fallopian tube. The left ovary was found to be normal, and the wound was closed immediately and as quickly as possible. I made no attempt to remove the peritonitic fluid which remained in the abdominal cavity after the removal of the cyst—indeed, no sponge or swab was introduced through the wound at any stage of the operation. Neither was any attempt at drainage made, the wound being closed and sealed up with celloidin at once.

The patient rallied during the afternoon, and the next day her pulse was 84 and her temperature 99·5°. There was no pain or vomiting from the time of the operation onwards. The temperature chart indicated that her recovery was quite uneventful. She has remained perfectly well up to the present date.

The tumour consisted of a unilocular cyst, about the size and shape of a "Rugby" football. There was a solid mass of myxomatous tissue, the size of a hen's egg, at the free end; it was this which felt like a fœtal limb on palpation. Close to the pedicle was a solid mass, the size of a fœtal head, which also consisted of myxomatous tissue. This it was which felt like a fœtal head lying in the hypogastric region. The tumour

represented the right ovary, and the enlarged Fallopian tube was stretched over its surface.

The case presents several features of interest. The diagnosis, to begin with, was not easy, and the subsequent clinical history did not at first sight tend to confirm it. A little thought, however, made it clear that the sequence of events was somewhat as follows. To begin with, the growth of the cyst was doubtless favoured by the gestation which began in the month of April. The enlargement of the uterus caused rupture of the cyst, which occurred on 26th July, accompanied by syncope and the disappearance of the abdominal swelling. The rupture of the cyst caused abortion, which was incomplete. This caused bleeding, and permitted of septic infection of the uterus, which was relieved by the treatment the patient received in the hospital. Pus, however, was left in the right Fallopian tube, for the temperature remained irregular until I saw her on 5th September. My examination on that day was followed by peritonitis, doubtless because my manipulations squeezed pus from the tube into the peritoneal cavity. This view was confirmed when, on dividing the pedicle, pus flowed from the cut end of the tube.

It may be asked why I attempted no peritoneal toilette, and why I did not use drainage. My reasons were as follows; It was clear that the patient's extreme condition on 9th September was due not so much to septic intoxication as to mechanical disturbance, due to the cyst and the free fluid in the abdomen She had already been in a thoroughly septic condition for at least a month, and her power of dealing with septic poison was therefore obviously good. If she died after the operation, it would be of shock, not of sepsis. I therefore avoided shock by operating as quickly as possible, by putting not even a sponge in contact with the viscera, and by closing the wound without inserting gauze or a drain tube. I also treated shock, not by intra-venous, subcutaneous, or intra-peritoneal injection of saline fluid, but by leaving in the abdominal cavity a large quantity of its own secretion, the peritonitic fluid. That this was quickly reabsorbed and that it did no harm, is clear from the after history, which indeed fully justified the somewhat unusual course pursued at the operation.

MEETING V.—MARCH 13, 1901.

DR MILNE MURRAY, *President, in the Chair.*

I. *The President* submitted the following minute:—

"The Fellows of the Edinburgh Obstetrical Society resolve to place on record an expression of their profound grief on the death of her late Majesty Queen Victoria. They desire to join in the tribute of universal admiration of the virtues displayed by Her Majesty in every aspect of her life; and to acknowledge, with deep gratitude, the supreme influence for good which, during her long reign, she exerted by the purity of her character and the nobility of her example.

"As members of a Medical Society, they would thankfully recall the sincere and unfailing interest which Her Majesty showed in every advance in the science and art of medicine, and the gracious sympathy which she invariably extended to all efforts directed to the amelioration of the poor, and to the alleviation of suffering."

The Society approved of the minute, and ordered it to be recorded.

II. The following were elected Ordinary Fellows of the Society:—Elsie Inglis, M.B., C.M., 8 Walker Street, Edinburgh; George Robertson, L.R.C.P., S.E., Royal Maternity Hospital; John Jeffrey, M.B., Ch. B., Royal Maternity Hospital; and John Wishart Kerr, M.B., Ch. B., 121 Trinity Road, Edinburgh.

III. *Dr Malcolm Campbell* showed, for *Professor Simpson*—(*a*) Four specimens of FIBROID UTERI removed by pan-hysterectomy; (*b*) an ŒDEMATOUS FIBRO-CYSTIC TUMOUR OF RIGHT BROAD LIGAMENT; (*c*) RIGHT TUBAL GESTATION AND LEFT HÆMATOSALPINX; (*d*) PAPILLOMATOUS TUMOUR OF THE LEFT OVARY; (*e*) three specimens from a case of PRURITUS VULVÆ, with papilloma.

IV. *Dr Fordyce* showed (*a*) an OVARIAN TUMOUR with twisted pedicle; (*b*) LARGE DERMOID OVARIAN CYST.

Patient with Fibroid Tumour, weighing after removal 24 lbs. The photograph shows (H) the large hernia lying in front of the tumour. (From a photograph by Dr A. W. G. Clark).

[*To face page* 119.

V. *Dr Graham* showed for *Dr Haig Ferguson* a FIBROID TUMOUR weighing 24 lb., with photographs of the patient before the operation. The tumour was removed three weeks ago, by abdominal hysterectomy, from a patient æt. 54, married and nulliparous.

The patient was conscious of having had the tumour for fifteen years. She also suffered from a large ventral hernia, and the circumference of her abdomen at the most prominent part of the hernia was 54 inches. A mesial incision was made in the abdomen, and in order to get room it was found necessary to divide the neck of the hernia. Considerable difficulty was experienced in dealing with the hernia, owing to the adhesions of the intestines to the hernial sac, and therefore Dr Ferguson, in order to save time and lessen the tendency to shock, applied a serre-nœud to the neck of the tumour, and thus treated the stump extra-peritoneally. The patient has made an excellent recovery.

VI. CASE OF CEREBRAL HÆMORRHAGE RESULTING FROM DECIDUOMA MALIGNUM.

By ELSIE M. INGLIS, M.B., C.M., Gynæcologist to St Ann's Dispensary; and ALEXANDER BRUCE, M.D., F.R.C.P.E., Assistant-Physician, Edinburgh Royal Infirmary.

THE tendency of hydatid mole to be followed by a local uterine tumour of a malignant nature and by metastases in other organs is now so well recognised by obstetricians and gynæcologists, and the pathology of deciduoma has been recently so fully investigated by a number of this Society, that it may appear at first sight like "carrying coals to Newcastle" to bring before you another example of the disease; but we trust that the unusual nature of the symptoms, local condition of the uterus and metastases presented in our case, will prove of sufficient interest and value to render it worthy of the attention of the Society. Our object is mainly to draw attention to the clinical features of the case, rather than to enter into the more difficult question of the pathological nature and origin of the tumour.

Before recording the notes of the case in detail, it should be mentioned that the patient was first under the care of Dr Elsie Inglis for hydatid mole, and that she was treated by Dr Bruce for the cerebral hæmorrhage of which she died. It was clear that cerebral hæmorrhage in a young woman of 22 was most likely due to a neoplasm; but that there was any connection between it and the abnormal pregnancy which had occurred six months before did not suggest itself to us, and in conversation with various gynæcologists it was ascertained that this association is not generally known or appreciated. The reason for this is obviously due to the small number of similar cases which have been recorded. We have analysed the records of 97 cases, and found that metastases to the lungs and various abdominal organs are very frequent, whereas we have been able to find only five instances in which there is a note of cerebral symptoms such as might indicate a metastasis to the brain.

The first was observed by Spencer in 1888 (noted by Morrison in the *Obstetrical Transactions*, vol. xxxviii., 1896). Others were reported by Fraenkel (*Archiv. fur gynæcologie*, 1895); Scherer (*Arch. f. gynæcolgie*, vol. lvi., 1897; Jurasowski (in the Russian Uratschevina Tapisky, 1897, and epitomised in the *British Medical Journal* in 1897), and by Gebhardt (*Zietschrift f. gynæcology*, vol. xxxvii.). In all these cases, except that of Fraenkel, a post-mortem examination was made. In three of these, Scherer's, Jurasowski's, and Gebhardt's, a definite tumour having the structure of deciduoma malignum was found. Spencer mentions the occurrence of thrombosis in the superficial veins of the cerebrum, but does not note the presence of any tumour. Our case, therefore, forms the fourth in which a metastasis in the brain has been definitely established, and, so far as we are aware, it is the first of the kind recorded in Britain. As will be seen subsequently, it differs from the others in that the secondary growth did not form a definite tumour, but had to be searched for by the aid of the microscope amid the blood extravasated into the substance of the brain. As will be shown also, our case differed from the great majority of others that have been recorded, in the fact that after the removal of the hydatid mole, the menses were

re-established, and continued in a perfectly normal manner during the few remaining months of life. In other respects, too, the patient appeared quite well, with the exception of a slight cough, which yielded immediately to treatment. It has been since learned that there was some slight hæmoptysis for a fortnight before the patient's death.

The following are the notes of the case:—

Mrs W., æt. 22, second pregnancy (first pregnancy normal, forceps).

13*th January.*—Had a sudden profuse hæmorrhage. No pain. Thought herself about five months pregnant. On examination, a uterine tumour was felt about the size of a four months' pregnancy, of a peculiar, doughy consistence.

On examination, the cervix was found to be soft and shortened. The os was closed.

15*th January.*—Still slight discharge. No pain. Vomiting began after this date; the vomiting became very troublesome, the patient being practically unable to retain anything.

18*th January.*—Another profuse hæmorrhage. Os still closed.

20*th January.*—Removed to Nursing Home. Condition as above; os not dilating; vomiting still continuing. After this there was only a slight discharge, which gradually ceased. The vomiting also ceased.

23*rd January.*—Dr Barbour saw the patient, and thought the case was probably one of hydatid mole.

27*th January.*—Temperature rose to 102°, probably from infection by a case of influenza in the ward.

28*th January.*—Sudden profuse hæmorrhage. Os still undilated. The vagina was plugged at 6 P.M., and it was decided that the os should be dilated mechanically the next day, and the uterus emptied.

By 9 P.M. what seemed to be labour-pains had begun.

29*th January.*—2 A.M. The plug was expelled, along with what was evidently broken-up chorionic mole. The patient was put under chloroform, and the uterus thoroughly emptied of the remains of the mole by means of the finger and blunt curette.

7th February.—The patient made an uninterrupted recovery and left the Home on the 7th of February.

May.—Patient consulted Dr Inglis for a cough, and was given a simple mixture. Returned the next week to report herself well. Appeared well, except that she was sallow, with black rings round her eyes, as she always had. Stated that the periods had returned, and were normal both as to time and quantity.

23rd June.—The patient was found by her husband lying on the floor in a fit. Had been vomiting. The only history to be obtained was that she had complained of colic in the morning. Otherwise she had been well. When seen at 3 P.M. she was lying with closed eyes. Was not quite unconscious, nor had she any paralysis of arm, leg, or face. Swallowed without difficulty. When told to turn on her side, did so, pulling the clothes up about her. 7 P.M.—Lying in the same condition, except that the mouth was drawn over to the left side. Still responded when spoken to. Pupils reacting normally. Had been vomiting. Sent to the Royal Infirmary, where she died suddenly three days after admission.

The following notes of the patient's condition were made by Dr Hill Buchan while under the care of Dr Bruce:—

Patient of fair muscular development, somewhat thin. Rather pale than flushed. Skin not specially dry, but no marked perspiration. Lying on back. She cannot be roused to look at anything or to speak, but occasionally if one moves her limbs or endeavours to open her eye (left), she resents it, and tries to prevent the opening of the eye by putting up her left hand. She also makes occasional spontaneous movements of left arm and leg. For the most part she lies without movement. The right arm she keeps in a position of semiflexion. When one endeavours to extend it some resistance is offered, the limb feeling rigid at the elbow. With a little force, however, one can fully extend it. When extending force is removed, it goes back to its former position. No rigidity about wrist or fingers. Right leg lies extended. Has not yet been observed in any other position. It is not rigid, and, when extended, falls heavily

back. Left leg and arm moved occasionally. No marked difference between two sides of face. Eyes shut. Much greater resistance on attempting to open left eye than on doing the same with right.

Sensation is not abolished.

Pupils.—Medium; left slightly larger than right.

Knee-jerks.—Left, exaggerated; right, markedly pressed. No ankle-clonus. No wrist-jerk. No plantar, and no abdominal reflexes obtained.

Pulse 60, of medium force, somewhat soft, wall not thickened. No irregularity detected. Diffuse impulse in mitral area, visible for about 2 inches from about ½ inch internal to mammary line in 5th interspace. Apex beat in 5th interspace ½ internal to mammary line. In mitral area first sound somewhat thumping, systolic murmur accompanying it. Murmur also heard in pulmonary area and very faintly in aortic, second sound reduplicated, heard best accentuated in pulmonary area. Systolic murmur not heard in axilla.

Respirations 24 per minute. No cough noticed. Breathing is regular. No deep sighs. No marked flattening in chest.

Urinary system.—Urine contains no albumen or sugar.

24th.—Patient remained in much the same condition during the night. This morning no marked change in general appearance. Pupils wider, left markedly more dilated than right. Left knee-jerk still increased. Rigidity of right arm less; seemed at time of examination to fall to the side more heavily when lifted than the left. So also as regards leg. Doubtful if she can move right leg. No marked difference in sides of face. *At night.*—Pupils again equal; right arm again rigid.

25th.—Patient has remained quiet. No marked change Pupils equal. Knee-jerks less marked. Some rigidity of right arm. Pulse slower (12 noon = 54), regular. Respirations 26; tend to come in circles of deeper and shallower series; no pauses; no sighing. Occasional attempt at vomiting.

26th.—Patient during night was quiet; restless at times Nurse noted movements in left arm, but none in left leg.

Vomited milk. Retained a little. This morning patient more flushed. Rigidity present in right arm as before. At 8 A.M. pulse 68. At noon 92. At noon rather softer and not quite as good in force as it was yesterday. Knee-jerk less marked.

Eyes.—An ophthalmoscopic examination was made at 1 P.M. by Dr Sym, who found no optic neuritis nor hæmorrhage, but veins large and full. About 1.30 patient noticed to breathe more stertorously. In a few minutes, froth slightly tinged with blood came from the mouth. Pulse could not be counted. Respiration appeared to be ceasing, and patient became deeply cyanosed. Artificial respiration was begun after respiration had ceased, the heart still continuing to beat. This was continued for about ten minutes, until the heart ceased to beat. Patient died deeply cyanosed. Pharynx was examined, but no foreign body found. At the commencement of these last symptoms, the heart's action seemed very rapid and tumultuous.

Sectio.—27th June 1900 (made by Dr Welsh).

External appearances.—Moderate nutrition; rigidity in lower limbs only; considerable lividity; slight discoloration. No evidence of external injury.

Thorax.—Pericardium contains 2 oz. of serous fluid. Each pleural sac contains a little deeply blood-stained serum.

Heart, 11 oz.—Slight diffuse thickening of pericardium. Arterial valves competent. Very little ante-mortem thrombus in right side of heart, and none on left side. Pulmonary 1, aorta ·85, mitral 1·3, tricuspid 1·5. Practically all valve segments are healthy, with exception of slight chronic thickening of mitral. Aortic arch and descending thoracic aorta very narrow, barely admitting little finger. Interior of aorta quite healthy. Coronary arteries also healthy. Left ventricle 3½ inches long, wall thin, ⅜, ⅜, ⅛. Muscle somewhat flabby and anæmic. Right ventricle dilated and slightly hypertrophied: wall nearly ¼-inch, maximum thickness. Both auricles dilated and not hypertrophied.

Lungs.—Right, 1 lb. 4½ oz.; left, 1 lb. 1½ oz. Scattered subpleural hæmorrhages (recent) chiefly in left lung. Bronchial walls congested. Lumen occupied by dirty brownish mucus, especially in left lung. In each lung there were numerous

rounded nodules, mostly from ½ to ⅓-inch in diameter. Nodules most abundant in lower lobes, situated in lung tissue near pleural surface, but not quite up to it, usually about $\frac{1}{16}$-inch of collapsed lung tissue intervening. Nodules firm to touch, on section of reddish-brown colour, apparently composed of recent and decolorised hæmorrhages and necrotic tissue; outline rounded; almost circular. Nature—apparently some secondary malignant growth; somewhat smaller masses, about ⅛-inch diameter; also in lower lobe, apparently due to thrombus, in medium-sized branches of pulmonary artery. These were sometimes situated close to the large rounded masses. Rest of lung tissue acutely congested and considerably œdematous.

Abdomen.—Peritoneum healthy.

Liver, 2 lb. 12 oz.—Healthy, with some patches of fatty change. Gall bladder and biliary passages also healthy.

Brain, 3 lb. 2 oz.—Extreme flattening of convolution over vertex, with marked bulging of left hemisphere in occipital region. No hæmorrhage into sub-dural or sub-arachnoid spaces. Arteries at the base healthy; large branches not thrombosed. Cerebral sinuses also healthy. Medulla pons and cerebellum showed no gross lesion.

Cerebrum on section showed a very large recent hæmorrhage in occipital lobe of left side, the white matter of which was completely destroyed and replaced by dark blood-clot. The great mass of this extravasation was situated above and behind the optic thalamus, and its upper and posterior surfaces came close up to the superficial grey matter in several places. Where the larger hæmorrhage was separated from the superficial grey matter, by a still persistent layer of white matter, there were several smaller recent hæmorrhages about ½ inch in diameter, and also several minute ecchymoses.

Spleen, 9 oz.—Somewhat enlarged; moderately firm; of dark reddish colour. Malpighian bodies prominent. No evidence of tumour growth.

Kidneys, each 4½ oz.—Small, but healthy. Capsule strips easily. Cortex healthy. Medulla congested.

Stomach and *intestines* healthy. Glands in mediastrium and abdomen not enlarged.

Uterus (Fig. 1) showed two separate masses of tumour

growth in muscular tissue of wall. Near fundus (A) one mass of greyish-white tissue, partly softened and necrotic, measures about ¾ inch transversely, and about 1 inch in long axis of uterus, situated about half-way between the mucous and peritoneal surfaces of the uterine wall, and showing necrotic and hæmorrhagic change. About ¾ inch below this was another mass (B) of necrotic tissue in wall, but of smaller size, and containing in its substance several small vesicles with thin wall and watery contents, varying in size from ⅓ to ⅛ of an inch in diameter.

Bladder and *rectum* healthy.

Tumour.—The microscopical examination of the tumour in the uterus and the nodules in the lungs showed that they were identical in their structure. In the uterus the tumour (Fig. 2) showed projecting villous-like processes, surrounded on their outer aspect by a layer (S) of rapidly growing multi-nucleated undifferentiated protoplasm. Contained within this was a core (L) of uni-nucleated polyhedral and much vacuolated cells (Langhan's layer). The outer multi-nucleated layer, as is seen in Fig. 3, formed numerous irregular projections into the surrounding blood-spaces. The resemblance of this structure to that described by Dr Haultain in the journal of the British Gynæcological Society, July 1889, was so intimate, that it seems hardly necessary to describe the appearances more minutely. Fig. 4 represents one of the smaller nodules in the lung, growing within a branch of the pulmonary artery. It shows, lying in blood-clot, irregular masses of undifferentiated protoplasm with multi-nucleated cells, and, in relation to these, uni-nucleated epithelial-like cells of a structure exactly similar to those found on the uterine tumour. As the opinion had been expressed before the post-mortem examination that the cerebral hæmorrhage was in all probability connected with a neoplasm, although the nature of this had not been suspected, a microscopic examination was made by Dr Welsh of portions of the blood-clot found in the occipital lobe. This demonstrated the presence of small tumour masses of a nature exactly similar to those found on the lung and in the uterus. A reproduction of the appearances found under the low and

Fig. 1.—Section of Uterus, showing position of the tumour masses (A and B) described in the text.

[*To face page* 126.

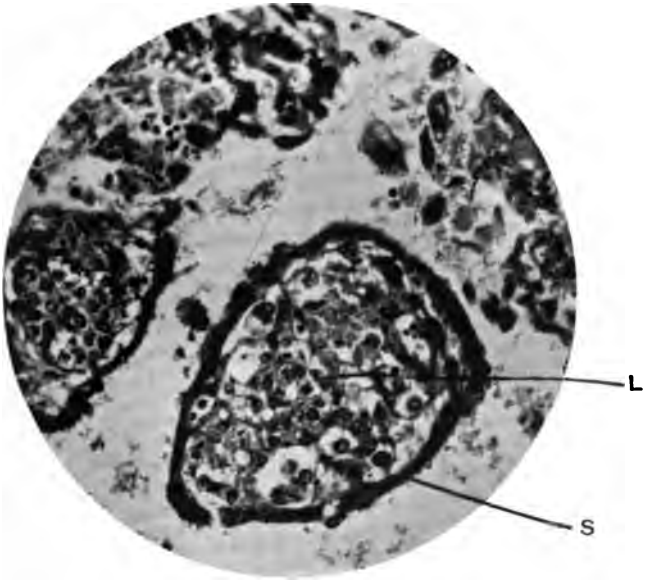

FIG. 2.—Section of part of upper Uterine Tumour, showing a villus-like process divided transversely and lined externally by a layer of syncytium (S), and containing uni-nucleated vacuolated cells (L).

[*To face page* 126.

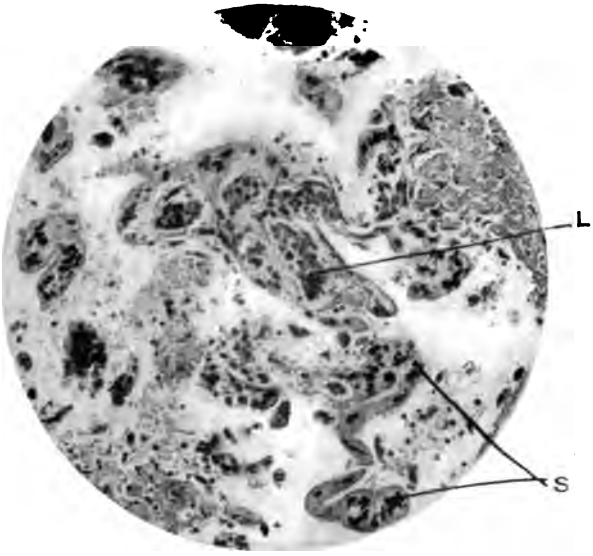

FIG. 3.—Section showing the irregular projections of undifferentiated protoplasmic masses (S), and uni-nucleated cells (L), surrounded by blood spaces.

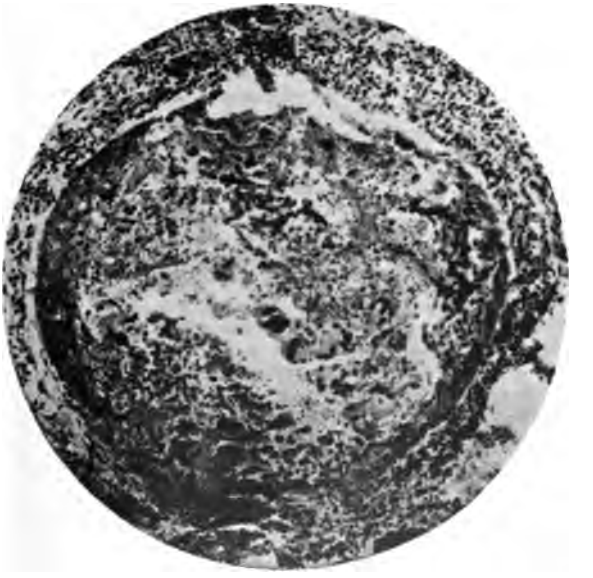

FIG. 4.—Section of small branch of Pulmonary Artery, showing tumour masses lying in blood-clot.

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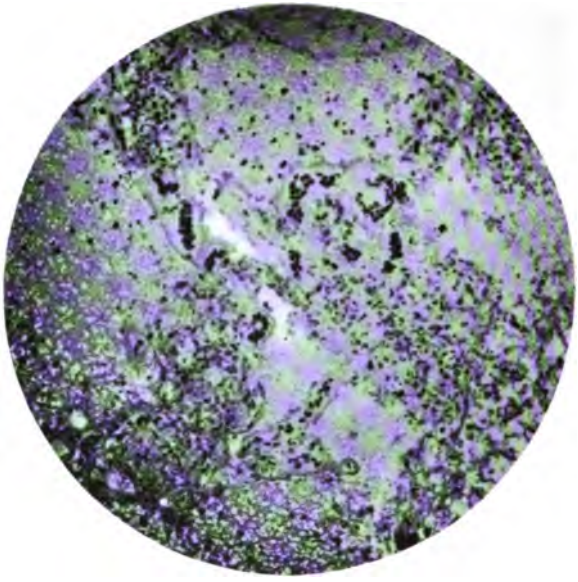

FIG. 5.—Section of Tumour in blood-clot in Brain, showing processes similar to those in Fig. 3. (Zeiss A. Oc. 4).

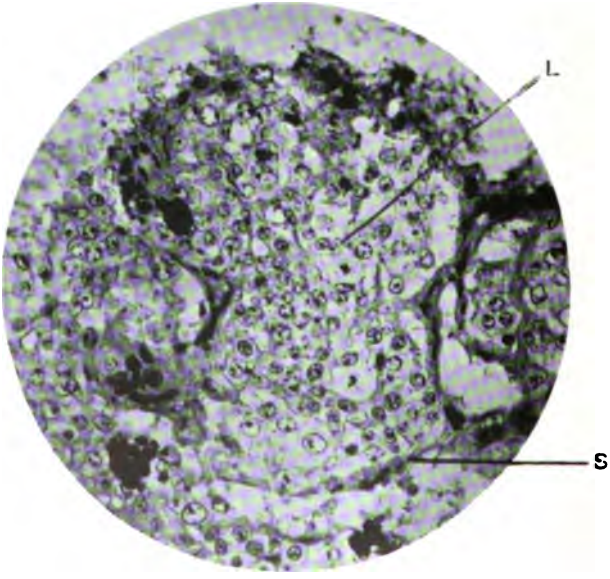

FIG. 6.—A portion of same Tumour of Brain, more highly magnified (Zeiss D. Oc. 4), showing syncytial masses (S) and epithelial uni-nucleated and vacuolated cells (L).

[*To face page* 127.

high power of the microscope (see Figs. 5 and 6), demonstrates the presence and the arrangement of the two classes of cells already described, and renders it clear that the neoplasm was a metastasis from the lung. It would almost appear as if the tumour had the power of producing a dilatation of the blood-vessels into which it grew, and thus paving the way for the hæmorrhages which were found in the cerebrum and in the lungs.

Although, as already stated, it is not part of our immediate object in reading this paper to discuss the pathology of this growth, still the appearances are so similar to those found and described by Haultain, Marchand, and Gebhardt, that we are inclined, with them, to regard it as being of epithelial rather than of connective tissue origin. As regards the nomenclature, therefore, the term chorio-epithelioma seems the most suited to describe the origin and nature of the growth. We append a brief analysis of all the cases of deciduoma malignum accessible to us, indicating the previous condition of the uterus, the site of the secondary growths, and the opinions expressed as to the nature of the tumour.

[TABLES.

DECIDUOMA MALIGNUM FOLLOWING HYDATID MOLE.

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
1. Meyer.	1888	55	3	Uterus enlarged; mucous membrane eroded; Nodules scattered through walls.	Incomplete p.-m.	Cylindrical structure. In some cases straight core of connective tissue with thick layer of epithelium. In other cases nothing but syncytium. "Epithelioma papillare corposis uteri."	*Arch. f. Gyn.*, xxxiii., 1888.
2. Kaltenbach	1890	..	..	Hydatid mole 1½ yrs. previously.	..	"Myxoma chorii."	*Centralbl. f. Gyn.*, 1890.
3. Guttenplan	..	28	7	Tumour in uterus.	Vagina.	Sarcoma; spindle-celled.	*Veit's Handbuch.*
4. Löhlein.	1892	47	6	Hydatid mole in 1890; friable mass felt through cervix; curetted; hysterectomy. Recovery.	0	Deciduo-sarcoma.	*Arch. f. Gyn.*, xlvi. p. 1.
5. Menge.	1892	35	8	Uterus not enlarged; nodules in ant. wall; curetted. Dismissed. Returned with placenta-like masses in uterus; profuse hæmorrhage.	Vagina.	Deciduo-sarcoma.	*Zeit. f. Gyn.*, xxx.
6. Klein.	1893	..	4	Uterus enlarged; contained masses of placenta-like tissue.	Lungs; vagina; tumour in left inguinal region.	Sarcoma.	*Arch. f. Gyn.*, xlvii.
7. Cazin-Segoud.	1893	30	3	Uterus enlarged; hysterectomy. Recovery.	Ovaries.	Sarcoma; giant cells.	*La Gynæcologie*, 1896.
8. Nove Jousserœaux.	1893	24	3	Uterus enlarged; hysterectomy. Recovery.	0	Sarcoma—(1) Cells grouped like those of a cancer, but lying in a granular or fibrillar substance. (2) Giant cells.	,, ,,
9. Müller.	1893	30	6	Uterine tumour.	Vagina; right inguinal region.	No post-mortem.	*Verhandl. d. deutsche Gesellsch. f. Gynæcologie*, Congress iv., p. 341.
10. Kœnitz.	1893	..	3	Uterine tumour.	Vagina; left broad ligament; lungs.	Destructive polypus of the placental site.	*Centralbl. f. Gyn.*, 1893.
11. Menge.	1893	18	1	Uterine tumour; nodule in ant. wall; curetted.	(?)	Deciduo-sarcoma.	*Zeitsch. f. Gyn.*, vol. xxx.

DECIDUOMA MALIGNUM FOLLOWING HYDATID MOLE—*Continued.*

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
12. Menge.	1893	..	..	Hysterectomy had been performed. Only p.-m.	Lungs; spleen; liver; stomach; between bladder and rectum; and in marrow of right femur.	Deciduo-sarcoma.	*Zeitsch. f. Gyn.*, vol. xxx.
13. Fraenkel.	1894	25	..	Uterus enlarged; ovaries cystic.	Spleen; bladder; parametrium vagina; p.-m. incomplete; clinical symptoms pointed to metastases in brain and lungs.	Alveolar and hæmorrhagic tumour. Large masses of syncytium.	*Arch. f. Gyn.*, xlix., 1895.
14. Shauta.	1894	29	5	Tumour in uterus; hysterectomy. Recovery.	Vagina and ovaries.	Deciduo-sarcoma. In places cells look like epithelium proliferating. Are really only decidual cells in contact.	*Centralbl. f. Gyn.*, 1895.
15. L. Pick.	1894	22	4	Hydatid mole.	Vagina during pregnancy.	Epithelial in origin.	*Berlin Med. Woch.*, 1897.
16. Tannen.	1894	22	3	Tumour in uterus; hysterectomy. Recovery.	..	Sarcoma. Decidual cells as described by Sänger.	*Arch. f. Gyn.*, 1895.
17. Neumann.	1895	29	5	Tumour in uterus; hysterectomy. Recovery.	Vulva.	Epithelium. Sarcomatous degeneration of mucous membrane.	*Centralbl. f. Gyn.*, 1896.
18. Lonnberg Mannheim.	1895	42	3	Hydatid 2 yrs. previously; uterus the size of fist; tumour in fundus; nodules in cervix; hysterectomy. Recovery.	Vagina studded with nodules.	Malignant serotinal tumour of uterus. Two forms of cells: (1) syncytial; (2) with well-defined nucleus.	*Monat. f. Gyn.*, iii.
19. Pestalozza.	1895	21	..	..	..	Sarcomatous degeneration of the mucous membranes.	*Centralbl. f. Gyn.*, 1896.
20. Apfelstadt and Aschoff.	1895	48	3	Uterine tumour.	1st symptom, nodule in vagina 8 days after delivery.	Lungs, spleen.	*Arch. f. Gyn.*, vol. l.
21. Bacon.	1895	48	10	Tumour mass in uterus.	Lungs; right broad ligament.	..	*Amer. Jour. of Obstetrics*, 1895.

DECIDUOMA MALIGNUM FOLLOWING HYDATID MOLE—*Continued.*

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
22. Ulesko-Stroganowa.	1895	26	1	Placenta-like tissue in uterus; curetted; hysterectomy. Recovery.	0	Cells filled with clearly marked nuclei, and giant cells with many nuclei. "Malignant chorioma." "Syncytioma." "Deciduoma malignum."	*Centralbl. f. Gyn.*, 1897.
23. Freund.	1895	..	..	Placental polypus.	Vagina.	Entirely syncytial.	*Veit's Handbuch.*
24. Neumann & Shauta.	1896	40	8	Hysterectomy after removal of mole. Recovery.	Nodule in vagina during pregnancy.	Syncytium and Langhan's layer.	*Centralbl. f. Gyn.*, 1896.
25. Lindfors.	1896	44	2	Uterus enlarged; tumour size of walnut.	Lungs.	Epithelial cells.	*Centralbl. f. Gyn.*, 1897.
26. Scherer.	1896	33	5	Tumour in uterus; hysterectomy. Death.	Lungs; liver; brain; right hemisphere, at junction of occipital and parietal lobes, size of hazelnut.	Syncytium and Langhan's layer.	*Arch. f. Gyn.*, lvi.
27. Rünge.	1896	44	..	Tumour in uterus; hysterectomy. Recovery.	0	Chorio-carcinoma.	*Arch. f. Gyn.*, 1896.
28. Vestberg, 1.	1896	32	..	Hysterectomy. Recovery.	0	Syncytium and Langhan's layer.	*Hygiea*, 1896.
,, 2.	1896	44	..	,, ,,	0	,, ,,	,, ,,
29. Jurasowski.	1897	..	..	Hydatid mole 2 yrs. previously; hysterectomy. Death.	Other organs and brain; true deciduoma, size of plum in right hemisphere; white matter.	..	*B. M. J. Epitome*, 1897, p. 275; *Vratchevinia, Tapisky*, No. I., 1897.
30. Zondak.	1897	43	17	Several small tumours in uterus; hysterectomy. Recovery.	0	Epithelium and syncytium.	*Zeitsch. f. Gyn.*, xxxvii.
31. Gebhardt.	1897	28	..	Uterine tumour; hysterectomy. Recovery.	0	Both layers of epithelial cells clearly distinguished.	,, ,,
32. Gebhardt.	1897	26	..	Tumour in uterus (vaginal metastasis first noticed).	Vagina; lungs; spleen; brain; left occipital lobe; tumour size of hen's egg.	Both layers of epithelium.	,, ,,
33. Marchand.	1897	42	5	Uterine tumour; hysterectomy.	Vagina.	Syncytium and fœtal ectoderm.	*Zeitsch. f. Gyn.*, 1898.
34. Marchand.	1897	22	1	Uterine tumour projecting into cavity, causing repeated hæmorrhage, with intervening normal periods.	Vagina; vulva; ovary; broad ligament; bladder; lungs.	,, ,,	,, ,,

DECIDUOMA MALIGNUM FOLLOWING HYDATID MOLE—*Continued.*

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
35. Neumann-Illich.	1897	51	..	Total extirpation after removal of mole.	0	Syncytium.	*Monatsch. f. Geb. und Gyn.*, 1897.
36. Holleman.	1897	52	..	Tumour in uterus, size of small cherry, occurred 4½ yrs. after hydatid mole, with intervening menopause.	..	..	Quoted *Zeit. f. Gyn.*, vol. xxxix.
37. Teacher.	1898	27	2	Tumour size of orange in uterus.	Right Fallopian tube; vagina; lungs; seen during pregnancy for hæmoptysis.	Epithelial cells and protoplasmic masses.	*Journal of Path. and Bact.*, 1898.
38. Treub-Doormann.	1898	51	..	..	..	..	*Veit's Handbuch.*
39. Haultain.	1898	..	..	Nodule in uterus; hysterectomy. Recovery.	0	Epithelium and syncytial masses.	*Journal of the British Gyn. Soc.*, 1899.
40. Smyly.	1899	..	x.-para.	Placental-like masses in uterus.	Lungs. No p.-m.	..	*B. M. J.*, 1900, p. 10, 260.
41. Müller.	1899	28	3	Hæmorrhage; hysterectomy. Recovery.	0	Epithelial.	*Monat. f. Gyn.*, vol. x., 1899.
42. Von. Guerard.	1899	40	..	Tumour in cervix, naked eye; carcinoma; hysterectomy.	0	Syncytial masses and fœtal ectoderm.	,, ,,
43. Solowij and Keyszhowski.	1900	47	..	Hydatid. Death.	P.-m.; lungs.	Syncytium in metastasis.	*Centralbl. f. Gyn.*, 1900.
44. H. Schmidt.	1900	36	10	Hydatid; uterine mucous membrane normal.	5 wks. later tumour in vagina.	Vaginal tumour. Chorio-epithelioma.	,, ,,
45. Anders.	1900	41	..	Large tumour; uterus filled with soft chorio-epithelial growth.	0	Chorio-epithelioma.	*Centralbl. f. Gyn.*, 1900, p. 930.
46. Anders.	1900	25	..	Small tumour; old hæmorrhage and cystic growths.	0	Syncytial. Chorio-epithelioma.	,, ,,

DECIDUOMA MALIGNUM FOLLOWING NORMAL LABOUR.

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
47. Spencer.	1888, reported 1896	..	2	Uterus—nodules on placental site. Cervix—fungating growth.	Lungs; brain. Frontal and parietal lobes mottled with irregular patches due to injected vessels of pia-mater; large veins from before backwards thrombosed, occlusion extending to longitudinal sinus; no tumour found.	Syncytium. Large cells. Delicate reticulum of connective tissue.	*Ob. Trans.*, vol. xxxviii. 1896.
48. Aczel.	1890	22	3	Uterus enlarged; tumour in fundus; nodule in cervix.	Lungs.	"Sarcoma."	*Monat. f. Gyn.*, vol. iii.
49. Steinhaus.	1892, reported 1899	37	6	Uterine tumour; hysterectomy. Death.	Vulva.	Reported at time as cancer. Later examination, chorio-epithelioma.	*Centralbl. f. Gyn.*, 1900.
50. Koeltnitz.	1892	..	2	Hæmorrhage; placenta-like masses in uterus.	Lungs; left tube and ligament; vagina.	..	*Deut. med. Woch.*, 1893.
51. Schmorl.	1892	..	..	Tumour discovered in uterus after death from typhus.	(?)	Sarcoma, deciduo-cellular.	*Centralbl. f. Gyn.*, 1893.
52. Lebensbaum.	1893	27	6	Tumour in fundus; hysterectomy. Death.	Vagina.	"Adeno-carcinoma."	" "
53. Franqué.	1895	32	6	Uterus enlarged; contained placenta-like masses; hysterectomy. Recovery.	0	Langhan's layer. Syncytial masses.	*Zeit. f. Gyn.*, 34.
54. Williams.	1895	35	6	Two small growths in uterus (treated for sloughing hæmatoma of vagina).	Vagina; left ovary; lungs.	Syncytium only. Masses of protoplasm epithelial cells.	*Johns Hopkins Hospital Reports.*
55. Pestalozza (1).	1895	..	7	..	Lungs.	Deciduo-sarcoma.	*Centralbl. f. Gyn.*, 1896.

DECIDUOMA MALIGNUM FOLLOWING NORMAL LABOUR—*Continued.*

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
56. Pestalozza (2).	1895	..	12	Uterine tumour; hysterectomy. Recovery.	0	Sarcoma. Spindle-shaped cells between muscle fibres, esp. near vessels.	*Centralbl. f. Gyn.*, 1896.
57. Morrison.	1896	35	10	Uterus enlarged; hysterectomy.	Lungs. Died of hæmophysis. No p.-m.	"Squamous-celled epithelioma."	*Ob. Trans.*, vol. xxxviii.
58. Cock.	1896	30	..	Uterus enlarged; nodule in post. wall.	Lungs; ovary (sarcoma).	Protoplasmic masses. Epithelioid cells.	*B. M. J.*, 1896.
59. Neumann.	1896	35	3	Uterine tumour; hysterectomy. Recovery.	Lungs; 3 months after.	Syncytium and fœtal ectoderm.	*Centralbl. f. Gyn.*, 1896.
60. Scherer.	1896	26	1	Uterine tumour.	Lungs (bloody sputum).	Syncytium and fœtal ectoderm.	*Arch. f. Gyn.*, lvi.
61. Traubenroth.	189.	38	6	Uterine enlarged, filled with necrotic mass; hysterectomy. Recovery.	0	Epithelium and syncytium.	*Berl. Klin. Woch.*, 1897.
62. Gebhardt.	1897	30	..	Uterine tumour; hysterectomy. Recovery.	0	Both layers of epithelium.	*Zeit. f. Gyn.*, xxxvii.
63. Schmorl.	1897	..	..	P.-m. No tumour in uterus or annexa.	Vaginal tumour (characteristic); metastases in lungs, liver, kidneys, bowel, and diaphragm.	Syncytial masses and epithelial cells.	*Centralbl. f. Gyn.*, 1897.
64. Hellier.	1898	39	7	Uterus enlarged; appendages involved.	Lungs; pericardium.	Epithelial cells and protoplasmic masses.	*Ob. Trans.*, 1898.
65. Neumann.	1898	..	..	Hæmorrhage; hysterectomy.	Lungs. Death from metastasis.	Epithelium.	*Wien. med. Woch.*, 1898. Quoted *B. M. J. Epitome*, 1899.

DECIDUOMA MALIGNUM FOLLOWING ABORTION.

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
66. Maier.	1876	..	3	..	..	Growth of decidual cells. True deciduoma malignum.	*Virch. Arch.*, lxvii. p. 55.
67. Küstner.	1876	..	3	..	..	Without doubt connected with the chorion.	*Arch. f. Gyn.*, Bd. 18, p. 252.
68. Chiari.	Three cases referred to by Pfeiffer.						
69. Sänger.	1888	22	1	Uterus progressively enlarged.	Lungs; diaphragm; broad ligament; left inguinal region.	"Sarcoma, deciduo-cellulare."	*Centralbl. f. Gyn.*; *Arch. f. Gyn.*, 1893.
70. Pfeiffer.	1889	36	6	Uterus enlarged; tumour size of fist in fundus.	Lungs; vagina.	"An excessive growth of the decidual elements." Deciduoma malignum.	*Prüger Med. Woch.*, 1890.
71. Gottschalk.	1892	42	..	Uterus enlarged; placenta-like masses removed.	Liver; spleen; kidneys; lungs.	Sarcoma of chorionic villi, affecting the stroma first. Tumour consists mainly of syncytium.	" "
72. Jeannel.	1893	26	..	Uterus enlarged; hysterectomy.	0	Sarcoma.	*Ann. de Gyn.*, 1894, vol. xlii.
73. Hartmann and Toupet.	1894	25	2	Masses like placenta.	..	..	*La Gyn.*, 1896.
74. Kuppenheim.	1894	33	5	Masses of growth in the uterus; hysterectomy. Recovery.	0	Deciduo-sarcoma (contained decidual cells).	*Centralbl. f. Gyn.*, 1895.
75. Resinelli.	1894	..	..	..	Vagina; liver; lungs.	Epithelial and giant cells, but no syncytial masses.	*Ann. di ostet. e ginecol.*, 1895.
76. Malcolm.	1895	27	7	Uterus enlarged; ruptured.	Lungs and mediastinal glands.	Sarcoma with protoplasmic masses.	*Obstet. Trans.*, vol. xxxviii.
77. Apfelstadt and Aschoff.	1895	33	3	Uterine tumour; hysterectomy. Death.	Lungs; liver; bladder; right femur.	Syncytium and epithelium. Fœtal tumour.	*Arch. f. Gyn.*, vol. l.
78. Gotzé.	1895	21	..	..	..	..	*Centralbl. f. Gyn.*, 1896.
79. Vestberg.	1896	36	..	Hysterectomy. Recovery.	..	Syncytium. Langhan's layer.	*Hygiea*, 1896.
80. Chrobak.	1896	33	2	Placenta-like masses in uterus; hysterectomy.	..	..	*Centralbl. f. Gyn.*, 1896.

DECIDUOMA MALIGNUM FOLLOWING ABORTION—*Continued.*

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
81. Reinicke.	1896	26	2	Uterine tumour the size of an apple; Porro's operation performed.	0	Sarcoma, deciduo-cellulare.	*Arch. f. Gyn.*, vol. xxxiii.
82. Martin.	1897	28	4	Uterus enlarged; hysterectomy. Recovery.	0	Syncytium and epithelial cells.	*Zeitsch. f. Gyn.*, vol. xxxvii.
83. Blumenreich.	1897	26	5	Uterus enlarged; hysterectomy. Recovery.	0	..	*Zeitsch. f. Gyn.*, vol. xl.
84. Lewers.	1897	24	..	Growth in uterus; hysterectomy. Recovery.	0	Sarcoma. Primary.	*B. M. J.*, 1897.
85. Traubenroth.	1897	48	..	Uterus embedded in mass; hysterectomy. Death.	Vagina; liver; lungs.	Epithelium and syncytium.	*Berlin Med. Woch.*, 1897.
86. Prochonik and Rosenfeld.	1897	37	8	Uterus contained placenta-like tumour.	No p.-m.	..	*Arch. f. Gyn.*, 1899, vol. lviii.
87. Veit.	1898	32	7	Tumour in uterus; hysterectomy. Recovery.	0	Deciduo-sarcoma.	*Veit's Handbuch f. Gyn.*
88. B. Morales Arjona.	1898	..	..	Hysterectomy. Recovery.	0	Protoplasmic masses.	*Annale de Obstet., Gyn., et Pediatria*, 1898, Madrid, Quoted *La Gyn.*, 1899.
89. Driessen.	1898	34	6	Nodules in uterus.	Lungs.	Sarcoma.	*Centralbl. f. Gyn.*, 1898.
90. Pehann.	1899	25	..	Tumours in uterus.	Vagina; lungs (after hysterectomy).	"Chorio-epithelioma." Syncytium and Langhan's layer.	*Centralbl. f. Gyn.*, 1900.
91. Steinhaus.	1899	28	4	Uterus enlarged; tumours.	..	Chorio-epithelioma.	,, ,,
92. Schlaganhaufa.	1899	..	..	Hydatid (uterus healthy).	Tumour in vagina; removed. Recovery.	Chorio-epithelioma.	*Wien. klin. Woch.*, 1899. Quoted by Schmidt, *Centralbl. f. Gyn.*, 1900.
93. Jörgensen.	1900	..	1 month early, no placenta	Curetted vessels full of new growth; hysterectomy.	No metastases; patient well a year after; hysterectomy.	Deciduoma-malignum.	*Monat. f. Gebürt.*, 1900, vol. xii. p. 98.

DECIDUOMA MALIGNUM FOLLOWING EXTRA-UTERINE PREGNANCY, ETC.

	Date.	Age.	Pregnancy.	Condition of Uterus.	Metastasis.	Microscopic Appearance.	Reference.
94. Ahlfeld.	1894	17	..	..	Vagina.	..	*Monat. f. Gyn.*, vol. i.
95. Marchand.	1894	17	1	Uterus normal.	Lungs.	Syncytium and fœtal ectoderm.	*Monat. f. Gyn.*, vol. i.; *Berlin Med. Woch.*, 1894.
96. Kösner.	1896	20	2	Uterus and right tube enlarged.	Vulva; vagina. No p.-m.	Syncytium and fœtal ectoderm.	*Monat. f. Gyn.*, vol. vi.
97. Nineforoff (Moscow)	Micro-photographs showing tumour formed from syncytium, and consisting of clear, polyhedral epithelial cells.						*Zeitsch. f. Gyn.*, xxxix., p. 205.

The President said the Society had listened with the greatest interest to this paper. The subject was one of intense interest to them on account of the comparatively recent development of this phase of pathology, and there had been considerable discussion as to its nature. They had two Fellows with them who had paid special attention to the subject, and he had pleasure in the first place in calling upon Dr Buist of Dundee.

R. C. Buist, M.D., Dundee, said:—

Mrs J., 42, had seven normal pregnancies and two miscarriages. I saw her on 4th April, with Dr Halley, who has kindly furnished the following notes. She had not missed a period. In January she had a flooding, with clots, and this had recurred when he was called on 13th February. She was put on ergot. Next day she had abdominal pains, and on getting up to have the bed changed, a lump, in which Dr Halley found several cysts, was discharged. On 15th March she had again severe bleeding, and on the 20th, under chloroform, the uterus was curetted, bringing away a number of shreds, and the uterus was douched and plugged. The plug was expelled next day, and she was directed to get up when the discharge should cease. On the 29th she had again severe bleeding, and looked anæmic. On 1st April the uterus was swabbed out with pure phenol. She was better after this; but, on the 19th, he was again called with the message that she was bleeding, and was dying. Ergot was given, and the bleeding stopped. The uterus was then curetted, and iron perchloride injected. The vagina was plugged. On the 24th she had again free bleeding, and I saw her with Dr Halley. I found the uterus about the size of a two months' pregnancy, freely mobile, and with open cervix. The left ovary was definitely cystic, and there was a less easily defined fulness on the right. The curette was introduced, and a small scraping removed. The patient was ordered calcium chloride, 40 gr., every three hours for two days. On the 29th she had again bleeding. Professor Sutherland examined the scrap of tissue I had removed, and reported that it contained blood-clot, endometrium with well defined glands, and in the blood areas groups of large and irregular cells, which, though suggestive of a

malignant process, were not characteristic. He approved of the determination which I had made, on clinical grounds, to perform hysterectomy.

After another severe bleeding, the patient came into my ward on 2nd May. She was extremely anæmic; had systolic bruits in both mitral and tricuspid areas. Her pulse was 130 per minute, regular, but of very low tension. The pelvic condition was as before, and there was a good deal of offensive discharge. She was put on digitalis and iron, and the vagina was douched twice daily. On 4th May she had had a good deal of bleeding, with clots; was slightly shivery, and the evening temperature had risen to 102·2. She was put on calcium chloride, 20 grs. every four hours, and had intra-uterine douches of formalin solution, $\frac{1}{1000}$; and as it was apparent that we should gain nothing by waiting, I removed the uterus vaginally under ether anæsthesia on 6th May. The ovaries were cystic, as large as oranges, and were also removed. The attachments were crushed with the angiotribe. After the operation the pulse was somewhat fuller, and at noon was only 90. She was at once put on nutrient enemata, which were well retained. In the afternoon the pulse began to quicken, and at night was 150. She was restless and had pain, and had morphia twice injected. During the night she slept two hours in all, but the pulse did not improve, and in spite of the use of strychnine and of saline suffusions she sank and died twenty-eight hours after the operation. No autopsy was obtained. The uterus had on its anterior wall an irregular ulcerating mass at the upper part. Microscopically, the tumour had cell groups, and hæmorrhages similar to those of my other case, but in addition there were large quantities of syncytial matter. The detailed pathological report will be presented along with that of the former case when Professor Sutherland and I have completed our investigations.

Mrs M. H., 24, admitted to Dundee Royal Infirmary on 1st May 1900, complaining of frequent menstruation since the birth of her (first) child, two years ago, but especially during the last three months.

She menstruated from 17, twenty-eight-day type, lasting

three days, and very free. During the last two years she has had one week dry, three weeks red discharge alternately, except that she had four months free from discharge preceding a miscarriage at the third month, in October 1899. Since then she has scarcely ever been dry. On admission she looked healthy and of good colour. The uterus was large and anteverted, and under chloroform was found to admit the sound 4 inches. It was dilated and curetted, and the anterior wall was found thickened, as if a lens were buried in it. The cavity was quite smooth. It was swabbed out with zinc chloride solution (40 gr. per oz.), and stuffed with iodoform gauze. The vagina was quite smooth and normal, and so were the appendages. The plugs were removed two days later, and in twelve days the patient, having remained dry, went to the Convalescent Home.

A week later, 22nd May, I was called to her home, and found that the bleeding had come on after three days. She was also now complaining of pain in the right iliac fossa, and there I found a tender swelling parallel to Poupart's ligament, of irregular sausage form, and as long as the forefinger. During the next few days it apparently subsided somewhat under rest, laxation, and hot fomentation. It became harder and never showed further sign of diminution, and the vaginal hæmorrhage continued. All my efforts to persuade her to re-enter the hospital were in vain, till August, when, after being apparently stationary, the iliac swelling had begun to increase, and she had lost strength and colour. On 7th August, the swelling was now the size of an orange and of nodular outline, and during the next two weeks (when I had a poisoned finger, and patient was in sequence on my promise to her being strengthened) it increased rapidly.

On 22nd August, she was given 40-gr. doses of calcium chloride every four hours as a coagulant, and on 24th August I operated, with chloroform anæsthesia. A mesial incision was made from umbilicus to pubes. The omentum being adherent to the tumour, was clamped off and divided. Its veins were noted to be very large. The tumour, an irregular nodular purple mass as large as a child's head, was then extruded. A band of attachment, fully an inch broad and containing large

vessels, reached the posterior abdominal wall over the iliac vessels from the upper part of the tumour. It was crushed and divided. The tube passed under the tumour in the arch formed by this band of attachment and the pedicle of the tumour. The tumour was then ligatured off from the right cornu, and removed after its attachment to the broad ligament had been crushed. The uterus was now found to have much increased in size, and, its attachments having been crushed, it was also removed. The vagina was at first merely cut across, then the cut edges were pulled up by clamps, and the angiotribe applied below. The left ovary and tube were apparently normal and were not removed. During the operation the pulse showed signs of flagging, and at successive intervals liq. strych. (10 m.), saline solution (2 pints), and ether (10 m.), were injected hypodermically, and saline enema (8 oz.) was also given. The pulse reacted well, and after patient was in bed was 120 and of full volume.

In the night, patient slept five hours in all and had no vomiting. On 27th August, she complained of pain at the vulva, but nothing abnormal was detected on inspection. On the 28th she had some blood-stained sputum. On 10th September Dr Watson's note says the wound is perfectly healed. There is always some spit, which is bright red. On examination the breath sounds are feeble at the right apex, where there is an occasional crepitation, and the percussion note is slightly higher than on the left.

On 12th September patient complained of pain at the base of the right lung, and a few friction sounds were heard on deep inspiration. On 14th September, my note on returning from holiday states that patient is anæmic and not eating well. The incision is perfectly healed. In the right iliac fossa, at the upper part, is a firm, irregular mass, walnut-sized, moving with the pulsation of the vessels beneath. On the same day, Dr Stalker examined, and found the signs of bronchial catarrh and some emphysema. On 15th September there was again severe pain and friction on the right side of the chest, the pulse was becoming more rapid, and the temperature began again to rise. On 19th September the pulse was noted 160, but the pain was much less. The mass in the iliac fossa had disappeared. It

was probably scybalous, as the bowel could now be felt to gurgle at the point. On 24th September patient could cough more freely, and had for several days had profuse sweating at intervals. For this she was with success kept beside an open window. On 25th September the detailed examination of the respiratory system, confirmed by Dr Stalker, showed—cough not frequent, slight watery mucous sputum occasionally streaked with blood. Respirations 30 per minute, shallow. Pain sometimes on right side of chest. Chest prominent anteriorly, V.F. much increased on right anteriorly. Note slightly flat in right supra-clavicular region. Breath sounds harsh, vesicular all over, with occasional rhonci. V.B. increased in right infra-clavicular region. Posteriorly, dulness over whole of right side, more marked below two finger-breadths over the spine of scapula. Over this area the breath sounds, vesicular in type, are almost lost. No moist sounds. Left side normal. On 29th September a few drops of thin blood-stained fluid, with few corpuscles, and less than 10 per cent. hæmoglobin, was drawn from the right base. On 3rd October a painless but exhausting diarrhœa, which began on 21st September, at length yielded to treatment. There was again pain on right side of chest, and a few streaks of blood in the sputum. On 5th October the chest signs were as before, except that the breath sounds at the left apex anteriorly are almost bronchial in quality, and also posteriorly from the root of the lung down. On 6th October she was sick and vomited, and almost collapsed afterwards. On 12th October she had spasms of pain at the upper part of abdomen on right, and great tenderness, and some friction sounds. On 13th October the cough was again troublesome, sputum frothy. On 16th October she had needed an opiate for two nights on account of pain at lower lumbar region, which made her unable to lie down. On 19th October the liver border was a full hand-breadth below the ribs in the axillary line. On 22nd October there was a little vaginal bleeding, and on 23rd October she died from increasing asthenia.

The family history is of importance, as her father died of malignant disease of an inguinal gland, with extension into the abdomen, and a brother died at ten years, while his abdomen

was being opened for sarcoma. In both cases the autopsy was refused, and I found this my most effective argument for the hard-won permission to examine this case.

The results of the autopsy, in brief, were:—Extensive infiltration of the right lung and liver; fewer nodules in the left lung, in both kidneys, adrenals, pancreas, heart wall, and left ovary; and a large mass in the right para-vaginal tissue. Both macro- and micro-scopically the tumour masses were all marked with the tendency to rapid necrosis and hæmorrhage, like the original tumour in the uterus. As Prof. L. R. Sutherland and I intend to present a detailed pathological report to the Society when the material in our hands has been fully worked up, the only detail of the cellular parts of the tumour that need be mentioned is that, so far, no definite syncytium has been found in this case.

Dr Haultain said he had listened with great interest to Dr Bruce's communication, as it very fully coincided with a case which he had himself examined and treated successfully two and a half years ago by vaginal hysterectomy. Lantern slides were shown of the miscroscopic characters of Dr Haultain's case, which demonstrated the two varieties of cellular elements, namely, individual cells with a clear cell substance, whose nuclei showed reticulation of the chromatin, and large multi-nucleated protoplasmic masses, the protoplasm of which was granular in character and the nuclei deeply stained. Commenting on the pathology and histogenesis of these growths, he stated that much controversy existed, there being three theories—First: that it was a sarcoma independent of pregnancy, but modified by that condition. To this, the London Obstetrical Society, in a late discussion on the subject, had almost unanimously pinned their colours. Second: that it was a malignant change occurring in the decidual cells, and was thus a maternal sarcoma, entirely due to pregnancy. This was the original theory propounded by Sänger, from which the term "deciduoma malignum" emanated. Third: that it was the result of active proliferation of the epithelial covering of the chorionic villi, and hence was of the nature of an epithelioma. To this theory the great majority of recent

German observers adhered, and he himself strongly supported. As is well known, in the young placenta the epithelial coverings of the chorionic villi are extremely active, the syncytial layer and Langhan's cells could be seen extensively proliferating, and if one examined closely these individual elements, they could hardly fail to notice the close resemblance which existed between these cells and those of the tumour in question. To still further pursue the histogenesis of the growth, one naturally turned to the consideration of the structure of the villi in myxoma of the chorion, for, although this was a rare disease in itself, occurring only once in about two thousand pregnancies, fully 50 per cent. of all cases of deciduoma followed the expulsion of a mole. On examining the villi of a myxoma one was struck by the excessive proliferation of the epithelial elements, as shown first by Ercolani, and thus an undoubted further link to the chain of evidence in favour of an epithelial origin was added. (Micro-photographs were here shown of the young placenta and myxomatous villi).

The upholders of the simple sarcoma theory base their arguments chiefly on the points that in some cases no distinct history of previous pregnancy was present, also that the cells tended to travel by the blood-vessels, and that similar structures had been noticed in sarcoma of the testicle. These arguments might be met, firstly, by the fact that no case had yet been described outside the child-bearing period of life, and though pregnancy could not be proved, neither could the reverse. The tendency of the cells to pass by the blood stream was the physiological characteristic of the epithelial coverings of the villi, whereby the maternal sinuses were opened into, and the nourishment of the fœtus obtained; while, though multi-nucleated protoplasmic masses had been noted in sarcoma of the testicle, these masses never assumed the characteristic reticulated form found in deciduoma malignum. In Sänger's original article, in which he described the growth as decidual in origin, the drawings show multi-nucleated protoplasmic masses, which, as far as drawings go, might be considered as similar to the syncytial masses derived from the villi. Further, he laboured under the disadvantage of having had no trace of villi in his specimen from which the origin of the growth could be followed. Every-

thing tended to point to an epithelial character, and the term "deciduoma" might be substituted by "chorio-epithelioma," the term "syncytioma" being too exclusive to include the proliferation of the cells of Langhan's layer. The clinical features were extremely interesting and important. Fortunately, unlike Dr Bruce's case, there was usually evidence of the presence of a new growth from the marked uterine hæmorrhage which prompted early interference. The presence of metastases in the lung, which were evidently inactive, had already been demonstrated by Von Franque and others, whilst they had also been noticed, and other surrounding structures, where, after the removal of the original uterine growth, a complete cure had resulted. This happy condition he could only account for by the probability that the cells could only live and proliferate in fluid blood, and that in the metastases they had given rise to so great an extravasation of blood that it subsequently clotted, and by this means deprived the cells of their vitality. It was an object lesson which should guide one in the future, that the presence of metastases was not a contra-indication to the radical extirpation of the original growth. He was sure that the Society were deeply indebted to Dr Bruce for bringing before them such an interesting and convincingly-demonstrated example of this rare and much controverted neoplasm.

Dr Berry Hart considered the papers of Dr Bruce and Dr Buist of great value. It was remarkable that in Dr Bruce's case the local symptoms were masked, but the "burying" of the tumours in the muscular wall explained this completely. The connection between hydatid mole and deciduoma malignum was certainly most astonishing, and he felt that a complete elucidation of the relation would go far to clear up the mystery of malignant disease. In examining one case of hydatid mole, he found the villous covering exactly the same as the protoplasmic masses found in deciduoma malignum. This patient, however, had so far remained well. Both papers were of great interest.

VII. NOTE OF A CASE OF SPONTANEOUS RUPTURE OF A VARICOSE VEIN OF THE RIGHT LEG AT THE SEVENTH MONTH OF PREGNANCY. SEVERE HÆMORRHAGE AND DEATH OF THE FŒTUS. EXPULSION OF THE FŒTUS TWENTY-EIGHT DAYS AFTERWARDS. DESCRIPTION OF THE MANNER IN WHICH THE PLACENTA WAS EXTRUDED.

By S. MacVie, M.B., C.M., Chirnside.

Spontaneous rupture of a varicose vein is not a common accident in the later months of pregnancy. It most frequently occurs after the child-bearing period is past, and as a consequence of chronic ulceration. In the present instance the patient was under forty years, active and healthy, and there was no ulceration deserving the name. Still more uncommon, the same accident had occurred in a former pregnancy, but as assistance was at hand the effects were not serious. The most uncommon feature of the case is, however, the disastrous consequences to the fœtus, and this feature is sufficiently rare to merit recording.

Mrs A., a v.-para, was a well-nourished, healthy, and active woman. Her complexion was normally well coloured, and her figure was well rounded, but not at all fat. Her children were all typical healthy, country children. The pregnancy had advanced to the last week of the seventh month. Although aware of a painful spot over a swollen vein, and remembering the rupture which had occurred in the former pregnancy, no precautions were taken. She was attending to her usual household duties, about 9 o'clock in the evening of New Year's Day, when she, while in a pantry off the kitchen, felt faint, and saved herself from falling by leaning against a table. On attempting to reach the kitchen, she fell and could not rise. Not having lost consciousness entirely, she managed to send one of her children for her sister, who lived about 300 yards distant. The latter, on arriving, found her lying where she fell, in a pool of blood. It is only fair to state that no share in the accident is attributable to the festivities of the day. She was dragged into the kitchen after a handkerchief

had been tied over the bleeding point, a pillow was placed under her head, and some blankets thrown over her. A ligature was then tied tightly round the leg, just below the knee. Other assistance having come upon the scene, a handkerchief was tied round the leg, above the knee, and kinked. This was not quite effectively done, as I found the kink untwisted. The treatment affords an interesting commentary on the value of ambulance lectures, where much is often made of ligatures and little of compresses. Some brandy undiluted was being given when I arrived. The patient was lying on the floor, blanched and cold; her eyes were only opened with effort, which, becoming relaxed, owing to her fainting condition, involuntarily closed. The respiration was of a gasping character, and at times she called feebly for air. The pulse was imperceptible at both wrists, and there was no bleeding. It was impossible to form an estimate of the amount of blood lost. Hot diluted brandy was given at first, and as soon as possible beef-tea was added. She was then lifted upon the kitchen bed, and 1½ pints of warm saline solution was administered per rectum. An hour later this was repeated, and the whole was retained, showing that absorption in such circumstances is somewhat rapid.

An examination of the leg showed a swollen vein about three inches above the ankle, on which were two breaches of surface nearly an inch separate, and both about a quarter of an inch in diameter. Probably in only one of these had the whole thickness of the vein become eroded, but the examination was not pushed to certainty. The patient was continuously fed with beef-tea and brandy, and slowly rallied. The limb was elevated, a compress applied, as well as other wrappings. Hot-water bottles were also gradually added as the fainting condition permitted.

Next morning the patient had rallied considerably, and the pulse was felt at both wrists. There had been no more bleeding. The following day considerable improvement had taken place; and, out of curiosity to learn the effect of the loss of blood on the fœtal circulation, I auscultated the abdomen. The fœtal heart sounds were not perceptible. On palpation the dorsum

was found on the left of the middle line, the head being in the pelvis. No movement of the fœtal limbs was felt, nor any rhythmic contraction of the uterus. The patient, on being questioned, said she had felt no "stirrage" since New Year's Day, when there had been active movement.

A waiting policy was compulsory in the circumstances, and during that and the following week the abdomen was frequently examined. It was noticed that the uterus flattened somewhat and became less tense, probably from absorption of the liquor amnii, upon which the uterus did not contract firmly, and probably also from want of tone in the uterine muscle. The fœtus also sank towards the pelvis, and the breach lay more inclined to the right, probably from the cause just mentioned, or from relaxation of the fœtal tissues.

The patient made good progress, and was able to be out of bed with the wound in the vein healed at the end of the second week. No other change took place until the morning of the 29th January, when uterine pains set in, and, after a normal labour, the dead fœtus was expelled. It may be mentioned that the membranes were rather tough, and were ruptured with the finger. In outward appearance, the body gave no indications of having been four weeks dead. The desquamation of the cuticle was not greater than may be seen where death has only occurred a week. The extent of cuticle stripped off, however, is no indication of the amount of decomposition, as it may depend upon the pressure of the maternal passages, and this will be greater or less according to the stage of the pregnancy and the relative size of the fœtus. The most marked evidence of decomposition was found in the cranial bones, which were detached and loose, and allowed the head to be moulded to any shape. The umbilical cord was a dull yellow colour, and broke under a slight strain. The placenta was removed by expression in half-an-hour, and showed no sign of decomposition except at the insertion of the cord, and this did not extend deeply or spread widely.

I began to compress the uterus, in order to remove the placenta, five minutes after the expulsion of the fœtus, as I wished to limit, if possible, the loss of blood; and I took the opportunity of noting the manner in which the placenta entered

the vagina. The pressure applied with the left hand was downwards, backwards, and from side to side, as uniformly as possible. The os was quite patulous and flaccid, and by pressing the perineum upwards I could reach with the finger an inch and a half above. At first nothing was felt, but in five minutes I touched a small area of smooth flat surface. By degrees this surface descended and became more convex, the convexity being downwards. For a time I could pass the finger all round between it and the uterine wall. It soon filled and distended the os, and the presenting part was like a half orange, corded and grooved on the surface. This part did not contain the insertion of the cord, which passed up between it and the anterior uterine wall. All at once a gush of blood filled the vagina, and on examining whence it had come, the edge of the placenta was found free of the os posteriorly, somewhat folded on itself inwards; that is to say, the uterine surface of the placenta was folded, so as to be in contact. Evidently a collection of blood had bulged the placenta downwards until the posterior edge was outside the os, when it escaped into the vagina. During the further descent the apex of this folded edge kept in front, and the placenta emerged from the uterus like a disc folded upon itself.

I formed the opinion that the separation of the placenta began in that part posterior to the insertion of the cord, and was accompanied by hæmorrhage. The confined blood apparently caused the presenting convexity, and that being situated not centrally but on the posterior half of the placental disc, the further separation was determined towards the posterior edge. Being first separated, it was first extruded; and as soon as the confined blood escaped, the contracting uterus simply folded the placenta upon itself.

I am not concerned to defend any theory of the normal extrusion of the placenta; because I see no reason to doubt that it may take place in various ways, the process either commencing centrally and continuing equally all round, or more marginally, and extending to the nearest edge before the other half was separated. If the process commenced marginally there could be no accumulation of blood, as the blood would escape as it flowed. It is enough to know that the efficient and initial

cause is the contraction of the uterus. The rest of the question is perhaps too academic for the general practitioner.

The President said this paper was of special interest on account of the rarity of the case. The child must have died at the date of the hæmorrhage, and there were little signs of maceration or decomposition. That might be accounted for by the fact that it did not die suddenly, but slowly.

VIII. MORPHIA AND COCAINE IN EMESIS GRAVIDARUM AND ABORTION.

By S. MacVie, M.B., C.M., Chirnside.

The association of two such dissimilar diseases as the vomiting of pregnancy and abortion, and their treatment by the same remedies, is an enforced acknowledgment of a kinship existing between them. Both diseases are reflex equivalents of etiological factors which exaggerate apparently normal conditions and give them a pathological significance. The vomiting of pregnancy attains its maximum of severity, and abortion its maximum of frequency, about the same period of gestation. The probability of their occurrence becomes less about the same period. There is sometimes a renewal of vomiting in the months most noted for premature births. Both diseases belong to the class of phenomena known as "reflex," and start as sensory impulses from the same irritated periphery—the mucous lining of the uterus or subjacent tissues.

So far, there is nothing to show why two sensory impulses starting from the same surface, or closely adjacent parts of the uterine wall, and travelling by the same spinal nerves, should part company at the "lumbar centre"—one being reflected to excite contractions of the uterus, the other passing on to the vomiting centre in the floor of the fourth ventricle, and being thence reflected to excite contractions of the stomach. Nor is it essential here to point out differences both in the mode of causation and site of origin of the essential stimuli. It is enough to have indicated points

of relationship sufficient to justify the expectation that a drug which restrains the vomiting of pregnancy may also avert a threatened abortion, and that a drug which proves of doubtful potency in the one affection may also prove a feeble reed to lean on in the other. It remains to be seen whether experience supports the conclusion. The number of cases does not warrant a dogmatic attitude, but they are, so far, confirmatory.

CASE I. *Hyperemesis Gravidarum.*—Mrs A. has had a disastrous puerperal history. The first child was prematurely still-born, and the puerperium was very protracted on account of hæmorrhage. I was called in without warning at the second confinement. It was a case of accidental hæmorrhage at the eighth month. The child was delivered with forceps after dilatation of the os digitally and with Barnes' bag. The child was still-born, and the hæmorrhage continued, at first severely and afterwards as a constant oozing, so much so as to awaken a suspicion of hæmophilia, assuming that this pathological condition may be found in only one organ. At the same time, the debility of the patient and gastric disturbance greatly hampered treatment. The third pregnancy was marked by rather severe vomiting, and was treated, as regards drugs, on ordinary lines. Advantage was taken, however, of the tolerance of food, often seen in such cases, while the recumbent position is maintained. Breakfast was given in bed an hour or two before rising, a light fluid meal was taken during the day, a more substantial repast after retiring, and a milk lunch during the night. This plan of night feeding was only partially successful, but it was continued until the tendency to vomit abated. The labour was again ushered in prematurely by hæmorrhage, and with the same result to mother and child.

The next pregnancy was not suspected when I was called to see her on account of acute pain referred to the urethra, difficult, frequent, and painful micturition and retching. The bladder was nearly empty, and an elastic catheter passed without difficulty, but with considerable pain. The urine deposited a large quantity of mucus, but was otherwise normal.

The patient had not missed a period, but expected to menstruate about that time. On vaginal examination the urethra was found somewhat swollen and painful to the touch, the uterus acutely anteflexed, enlarged, jammed against the symphisis pubis, and acutely painful, and the cervix was congested. The vaginal secretion was abundant. From the first, pregnancy was included in a diagnosis of acute anteflexion and consequent cystitis from pressure. The urethral pain called for immediate attention, and morphia suppositories, moist heat, and aerated potash water and milk were prescribed. The result was relief to the pain and dysuria, aggravation of the retching next morning, and an unaltered mucous deposit. As it was necessary to continue to treat the urethral pain, the remedies were only pushed a little more for another day. Then the retching called for treatment almost as urgently, and arguing that the morphia was in some degree responsible for the aggravation by its after-effects, cocaine pessaries were substituted. Menstruation had not set in, and the treatment was directed mainly to the suspected pregnancy; a topical anæsthetic to neutralise the sensory stimulus arising from an irritable uterus. The anteflexion called for treatment, but the parts were too sensitive to permit the introduction of a mechanical support; but the overhanging fundus was pushed upward as far as possible. The *horizontal* position was prescribed, but as the patient was above average size and rather stout, and the bed soft, only a *recumbent* position was obtained. The difference is this: In the recumbent position the bed becomes depressed in the centre, and the head, shoulders, and limbs occupy a higher level than the pelvis. The patient forms two inclined planes, which are joined at their lowest points. The junction corresponds to the pelvis, and forms a more or less obtuse angle. In this position the venous return from the lower extremities is free, while from the abdomen there is a resistance from the weight of the ascending current blood column, and a consequent venous stagnation at the pelvis. Nevertheless, the benefit from the cocaine was clearly marked, the urethral pain was abated, the vomiting ceased, and, what was not expected, the mucus deposit was diminished. With the object of getting the fundus uteri away from the bladder and relieving the pressure of the

anteflexion, the pelvis and limbs were raised and the patient laid in an inclined plane, of which the shoulders were the lower end. By this means also the cocaine pessary was more effectually applied to the cervix. In the course of a few days the improvement was such as to permit a less frequent use of the cocaine. It was found, however, that while the elevation of the limbs and pelvis was enough to cure the cystitis, it was not enough to cure the vomiting. The mechanical remedy cured the mechanical evil, but not the reflex manifestation. This practically completes the statement of the case. The treatment was continued, with some intermissions, for four months, and the patient's general health was well maintained—an important matter, in view of the future labour. It may be added, however, that at the seventh month she was put to bed, and after a course of iron, arsenic, and strychnia, a female child was born at term, after an uneventful labour. There was no hæmorrhage, and the patient was out of bed on the seventh day.

CASE II. *Emesis Gravidarum.*—The second case of vomiting of such severity as to compel abstention from work, was an unmarried primipara employed on a farm, three months pregnant. The uterus was slightly anteflexed. The treatment was by cocaine pessaries, applied with the pelvis and lower limbs elevated slightly above the level of the shoulders. At the end of a week she was well enough to resume work, but by doing so provoked a recurrence. It was found that the introduction of a pessary an hour before rising enabled her to work half a day. At a later period retching occurred at three o'clock in the morning, and this was checked by introducing a pessary after retiring. Otherwise the pregnancy ran a normal course. At no time were the physiological effects of the drug manifested.

CASE III. *Inevitable Abortion.*—This case is of special interest, because it affords another contrast of the action of cocaine and morphia. Mrs M., a nullipara, over 30 years, had a rather irregular menstrual calender. It showed twice a blank of one month, and once a blank of two months prior to

the occasion now to be described, when there was again a two months' blank, and the third period was due in a month. I was called upon about five o'clock in the afternoon. She had suffered all day from periodic pain and considerable vaginal hæmorrhage. The uterus was retroverted and enlarged, and the os did not admit the examining finger. Its edge was tense and inelastic, and in the centre was felt a small soft protrusion. The shape of the uterus was peculiar. The cervix and body were not marked off from each other by any discernible boundary. To use a homely and familiar simile, it resembled a Scottish schoolboy's "peerie" with the shod or spike extracted. It gave the idea of a dilated internal os and a rigid external os, with the unbroken membranes presenting. The case was diagnosed as "inevitable" abortion, and as the hæmorrhage was not excessive, matters were allowed to take their course. On the pains becoming more acute, and the patient kept calling for relief, and as the case of hyperemesis gravidarum was under treatment at the same time, and the relief of pain then obtained fresh in my mind, a cocaine pessary was employed with elevation of the pelvis. Its effect was soon apparent in less severe and also fewer pains. This continued till nearly ten o'clock, when the pains again became more severe. The point of the finger could then hardly enter the external os although considerable pressure was used, and the soft protrusion was but little larger. The patient still called for relief, and, perceiving that in the greater infrequency of the pains, due to the cocaine, more had been obtained than was expected or desirable, I substituted a morphia suppository. At eleven o'clock the patient was asleep, and was left undisturbed until one o'clock. On making an examination then, I found the ovum with the membranes intact lying partly in the vagina and partly in a dilatable cervix.

CASE VI. *Threatened Abortion.* — Mrs B. had aborted in the third month of her first pregnancy. The second pregnancy went to full term and was in all respects normal. The third pregnancy was nearing the end of the third month, when hæmorrhage occurred, and continued two days. On the third day intermittent pains set in, and I was sent for.

I found her moving about the house downstairs. She was immediately put to bed and warned of her risk. Recalling the opposite effects of cocaine and morphia in the preceding case, where cocaine lessened pain and also diminished the number and force of the contractions, while morphia even more completely lessened the consciousness of pain and apparently allowed the uterine contractions to go on unchecked, and also to promote dilatation of the external os, and as this was a case where, if possible, the abortion was to be averted, cocaine pessaries were used instead of morphia. The result confirmed expectation. The hæmorrhage and pain ceased, and after three days in bed the patient was downstairs. The pregnancy went to full term, and a healthy female child, 8 lb. weight, was born.

CASE V.—Mrs A., a multipara, had aborted once previously. Hæmorrhage and pain set in together, and I was sent for in anticipation of a miscarriage. Under the same treatment the manifestations were checked, and a healthy male child was born at full term.

CASE VI.—Mrs L., a multipara, was seized with hæmorrhage and recurrent pains after missing two periods. The fact that menstruation was actually suppressed for two months is noteworthy in this case. The treatment was by cocaine pessaries and absolute rest. After a week in bed the patient was allowed to resume her household duties. Four weeks later, the same symptoms occurred, but the pain was less severe. Under the same treatment the symptoms disappeared. Vaginal examination, however, revealed a shred of membrane about an inch long hanging from an os, which could hardly be said to be dilated. As it could not be detached with the finger, it was left till next day. Unfortunately it came away in the interval, and was not preserved. The patient was soon well. At the next period a slight hæmorrhage again occurred, without pain, and disappeared after two days' rest in bed. This might be considered a case of menstruation during pregnancy, though the two months' suppression to which attention has been called rather negatives that interpretation. Menstruation during the first three months of pregnancy is indeed very rare, and the rarity of menstrua-

tion returning during pregnancy after two months' cessation must be phenomenal. This case also terminated normally at term.

CASE VII.—*Emesis Gravidarum.*—Mrs C., a iii.-para, whose youngest child is six years of age, suffered from puerperal convulsions in her first confinement, followed by a defective memory which lasted six months. She had missed two periods, and suffered considerable distress and inconvenience from retching. As the case was not considered severe, oxalate of cerium was prescribed in 5-gr. doses. She expressed as feeling better. The improvement was rather peculiar. Her words were, she "could vomit with more ease." A cocaine pessary was ordered to be used an hour before getting up in the morning, and the morning sickness disappeared.

These cases are not marked by any exceptional features, nor are they of unusual severity. They are in fact quite ordinary, and have occurred consecutively. But they are of special value as examples uncomplicated by pre-existing or intercurrent disease in organs functionally related to gestation, or those discharging excretory functions for the entire economy; they afford a clearer field for the study not only of reflex activities but also of the therapeutic effects and *modus operandi* of drugs. It cannot be said of the treatment adopted in these cases that it succeeded when other treatment failed, a too common and often a most fallacious mode of reasoning, since it omits the fact that diseases vary in many ways during their course. But certainly the treatment is simple, and in ordinary cases satisfactory. Apart, however, from the evidence they furnish of the value of cocaine topically applied, the first case of vomiting and the case of inevitable abortion afford an instructive comparative estimate of the value of morphia and cocaine.

Dealing first with the case of inevitable abortion, there are two points to be noted:—

1. The lessened frequency and force of the uterine contractions during the topical anæsthesia of cocaine.
2. The unconsciousness of pain and the continuance of uterine contractions under the influence of morphia.

The more clearly to elucidate this difference, the essential facts of reflex phenomena may be recalled. These are (*a*) an irritated periphery, from which sensory impulses arise; (*b*) a centre of grey nerve matter where these impulses are received, intensified it may be, and reflected to (*c*) a muscular tissue or a secreting gland. These are, in treatment, the points of attack. When it is possible to completely soothe the irritated periphery by removing the irritative agency, the sensory stimulus does not arise. If the irritation cannot be removed, the sensory surface may be so anæsthetised as to be insensible to the irritation, and again no sensory stimulus can arise. This is precisely what happens in greater or lesser degree during cocaine anæsthesia: the reflex action is prevented at its starting-point. And assuming that the uterine contractions during abortion are excited by motor impulses issuing from the "lumbar centre," in consequence of sensory impulses received from the irritated uterine mucous membrane, it follows that, to arrest the sensory impulses is also to prevent uterine contractions.

Morphia, on the other hand, acts primarily and most powerfully on the higher centres. It is more analgesic than anæsthetic. Indeed, the topical effect of a morphia suppository is but slight, both as regards the irritated periphery and the "lumbar centre." It can neither arrest the sensory stimulus wholly nor the receptivity of the reflecting centre. But, by its analgesic effect on the higher centres, it prevents the consciousness of pain, while allowing the uterine contractions to continue. Hence it follows that in inevitable abortion, when the aim is to encourage the expulsion of the ovum, morphia is the preferable agent should the pain demand relief; while, on the other hand, in threatened abortion, and the object being to restrain uterine contractions, the use of cocaine is more rational and effective. It is difficult to understand the reliance placed upon it by the older practitioners. Probably its true function is comparable to the horizontal position. The latter lessens cardiac activity, equalises the circulation, promotes the venous return from the pelvis, and gives physical rest; while morphia lessens the respiratory movements and gives mental quietude. It adds rest of mind to rest of body. But that is not enough to avert an abortion, since it has been shown that the ovum has been

expelled during sleep, following its administration. There is no need to minimise the value of morphia, but it is well to know what we are doing, and how much.

In the vomiting of pregnancy, cocaine topically applied also arrests the sensory stimulus at its starting-point. But it may also be applied at the opposite extremity of the reflex arc, viz., the stomach, where it anæsthetises the responsiveness of the gastric muscle to motor impulses. *Cæteris paribus*, to choose the sensory surface is the more rational method. The points to be considered are various, and the decision may be difficult. The stomach is a convenient receptacle, but presents a large surface, and the dose may be so diluted by the contained matters that its action is feeble and ineffectual. On the other hand, during the day a patient may prefer her retching to the inconvenience of applying a cocaine pessary in bed and resting an hour. The area of the uterus to which the anæsthetic effect of cocaine radiates, and the depth to which it penetrates the submucous tissues, are still undefined. A still more open question is the area of the uterine cavity most liable to irritative influences, though many facts lead to the opinion that the internal os and lower segment form the larger portion. Nevertheless, the cervix seems the preferable point at which to apply the drug; the dose must always be more constant, and the effect more certain.

The action of morphia, on the other hand, is difficult to understand, keeping in view that we are considering purely reflex vomiting, and not gastric disturbances due to altered secretions. To begin with, morphia has little or no effect on motor impulses, even when the reflex centre is situated so high as the floor of the fourth ventricle, and therefore its restraining influence upon the muscular wall of the stomach must be slight or doubtful. It may relieve gastric pain, and doubtless does so, but the nausea following its use would appear to neutralise any relief it affords. It has been said that a sensory stimulus passing along a reflex track ends in a muscle or a secreting gland. To assume that the excretory gastric apparatus is stimulated at the same time and by the same stimulus, is no great stretch of the scientific imagination. Indeed, in some cases the secretions may be most affected,

myoma, removed by abdominal hysterectomy; (*b*) THIN WALLED DERMOID OVARIAN TUMOUR, which had ruptured on three occasions previous to removal.

V. PRIMARY CARCINOMA OF THE FEMALE URETHRA.

By J. A. C. KYNOCH, M.B., F.R.C.P. (Ed.), Professor of Midwifery and Gynæcology, St Andrews University.

NEW growths of the female urethra, although frequently observed, and reported under various names, were, previous to the classification proposed by Winckel, generally classed under the single heading of "vascular tumours." Winckel classifies urethral growths into—condylomata; glandular tumours; connective tissue tumours; angiomata; and epithelial growths. It is with the last group that the following notes deal.

On looking over lists of carcinoma prepared for statistical purposes, we find that the urethra is one of the rarest organs affected. Its rarity is further shown by the number of published cases affecting the female urethra, not exceeding 30, and that of the male urethra being only about 12. It is difficult to explain why malignant disease of the female urethra should be so rare, presenting, as it does, conditions which are supposed to predispose to cancer. Fritsch suggests that the constant washing which the urethra receives from the passing urine, in conjunction with the consequent frequent dilatation and contraction of the canal, prevents the cancer cells obtaining that fixation necessary for their growth and development.

He thinks this may partly account for the comparative rarity with which the urethra is involved or its function impaired in cancer of the vulva, even in an advanced stage. Unfortunately, however, this washing process is unable to prevent the invasion of the urethra by the gonococcus, and the same probably holds good for cancer cells. Hollinger has pointed out that repeated irritation (as, for example, chronic inflammatory conditions, and urethritis, with the formation of scar-like tissue in place of normal mucous

membrane) predisposes to carcinoma. We cannot, however, accept these inflammatory conditions in the female urethra as of much etiological importance, because of their frequent occurrence unassociated with cancer.

Malignant disease of the female urethra was first observed by Ribini, in 1844, and two years later Melchiorj published four cases. He describes the condition as being either first periurethral cancer, beginning as nodules on the vestibule, and extending along the connective tissue outside the wall of the urethra, without necessarily affecting it or its mucous membrane; or, second, and more rarely, a primary urethral cancer, springing from, and spreading along, the mucous membrane. Winckel, in 1898, published two cases: in one the growth was pedunculated, and had its origin in the urethral mucous membrane; the other case was associated with cancer of the bladder. Winckel proposed to replace the term periurethral by vulva-urethral, because such cases were generally an extension of cancerous nodules originating on the vestibule, and to limit the term primary cancer to those cases originating from the urethral mucous membrane.

Secondary cancer of the urethra, although more frequent than primary, is not often seen. Gusseron found that of 311 cases of cancer of the uterus, the urethra was only affected in 56 cases as compared with 128 of extension to the bladder. Doubtless the death of the patient prevents the chance of such extension taking place. Primary cancer of the urethra appears to be rarer than the periurethral form. Deitzer found in 18 cases—7 primary; 11 periurethral. Bosse found in 25 cases—20 periurethral, and 5 primary. Ehrendorfer in 27 cases found only 5 primary.

The primary form has its origin in the epithelium (most frequently) or glands of the urethral mucosa, where it forms either a vascular polypoid growth or a hard nodulated sessile tumour, spreading along the floor of the urethra towards the neck of the bladder, and eventually by deeper extension producing a urethra-vaginal fistula. The periurethral, or more correctly the vulvo-urethral, has its origin in the epithelium, at the junction of the urethral orifice and vestibule, from which it

spreads spirally round the urethral wall, thus differing from ordinary vulvar cancer, which spreads superficially to adjacent structures, the urethra being seldom involved. It is only in early stages of the disease that its original form can be defined. Urethral cancer is found in patients of all ages, but the following statistics show that it is most frequent after the menopause. Of 27 cases collected by Ehrendörfer, there were—under 40 years, 4 cases; over 70 years, 1 case; between 40 and 50 years, 3 cases; between 50 and 60 years, 10 cases; and between 60 and 70 years, 9 cases.

The early symptoms, namely, pruritis and painful micturition, are not usually severe enough to compel the patients to seek advice, which they only do when the disease is so far advanced as to cause incontinence of urine, or the presence of a tumour at the vulva. On the other hand cancer of the male urethra comes sooner under observation because of the earlier and greater difficulty with micturition and the occurrence of cystitis. The diagnosis usually presents no difficulty. The hard breaking-down edges of the dilated urethral orifice, the indurated urethral wall, felt per vaginum with the aid of the endoscope, to ascertain the extent of the disease, are as a rule sufficient.

Melchiorj describes urethral cancer as divisible into three stages, according to its extension—a division of importance from the operative and prognostic point of view. They are—(1) when confined to the lower half of the urethra; (2) when the pelvic fascia and neck of the bladder are involved; (3) when the disease has extended to the symphysis pubis and surrounding parts.

The treatment, essentially operative, has not given very favourable results. In Ehrendörfer's collection of 27 cases, only Winckel and Melchiorj are able to report a case free of recurrence after an interval of three and six years. Early recognition of the disease, especially before the sphincter becomes involved, is here, as elsewhere, the important factor. Zweifel, however, reported in the *Centralblatt für Gynäkologie*, 1893, a case where the neck of the bladder involved in the disease was excised, sutured, and a vesico-abdominal fistula established by supra-pubic cystotomy, after the method of

Witzel. Battle and Goldberg have also reported cases, the latter closing the vagina by episiokleisis, after establishing a recto-vaginal fistula. In all those cases, however, there was recurrence within eighteen months.

The following are the notes of a case which came under my observation last year:—

Mrs B., 49, was admitted to my ward on account of slight irregular hæmorrhage, and a vulvar tumour of three months' duration. There was no pain or great difficulty with micturition. Her previous health had always been good. Menstruation regular; twelve children, five dying in infancy. On examination, the urethral orifice was dilated to the size of a sixpence, the edges hard, ulcerated, and breaking down easily on manipulation. The floor and labial walls were indurated from cancerous infiltration, which extended nearly to, but did not appear to involve, the neck of the bladder and internal sphincter. The uterus was normal in size, mobile; the vagina was unaffected, the hard urethral floor being easily felt through the anterior wall. Microscopic examination of the growth showed it to be a typical epithelioma with abundant cell nests.

Guided by a catheter, the lower two-thirds of the urethra was excised by a circular incision, the edges of the remaining third being sutured to the edges of what remained of the vestibule. The patient remained comfortable for three months, when the occurrence of incontinence for the first time showed extension of the disease backwards, with involvement of the sphincter. No further treatment was consented to, and the patient died ten months later. On post-mortem examination the disease was found to be confined to the lower part of the bladder, there being no involvement of the surrounding parts.

Dr Haultain said he would be glad to hear remarks on this interesting case of Dr Kynoch's. He thought they might say the condition was one of extreme rarity. Dr Kynoch had shown it had only been demonstrated in a very few cases indeed. As to why it should be so, he thought they must still remain absolutely in the dark; but it would appear that any

attempt at cure seemed almost hopeless. The only case in which he had an interest which at all simulated carcinoma of the female urethra was one he demonstrated to the Society six months ago, and then he called it fibro-adenoma of the vagina; but, looking very deeply into that case, he felt constrained to think it was carcinoma of the urethra, because it closely blocked that tube, and was outside the membrane of the vagina. The tumour was said to be of vaginal origin, and bulged like a cystocele outside. It was connected with the urethra, from which, practically speaking, it had to be dissected. Of course that tumour must have been essentially different from the carcinoma which Professor Kynoch had demonstrated to them, because here they had pure and simple glandular tissue intermixed with a large amount of fibrous tissue. In this case there had been no recurrence of the growth, but one might expect to get it.

VI. THE ART OF VACCINATION.

By J. B. Buist, M.D., F.R.C.P.E.

I desire to remark at the outset that, in venturing to address this Society upon the art of vaccination, I have no wish to be dogmatic, because I recognise that all of you—every individual—are statutory vaccinators. Every registered practitioner is a statutory vaccinator, and as such, is entitled to vaccinate in any way he pleases. So, kindly take my remarks as simply the result of my personal experience, and not as if I were wishing to dictate to any of you in what I have to say.

I wish, in the first place, to discuss what I have found to be the best methods of operating the different methods which vaccinators employ in order to produce their results. The first method is punctures. Now, a puncture is defined as simply a prick. You may make a prick with a needle, or a sharp knife, and you may do this over an area of certain amount, and you may make a large number of such punctures. The next method is by incision, where simply superficial cuts are made in the epidermis, extending to its deeper layer. At the same time we insert the lymph into the cutis, because we generally come

against the apices of the papillary layer of the epidermis. These punctures and incisions are usually made by sharp cutting instruments.

Then we have lacerations and abrasions, which are of the nature of tears of the epidermis. The epidermis is torn through by such instruments as needles, rakes, or machines. We may have a series of needles either set in handles, or, it may be, fitted to instruments for the purpose, which I will show you. Then sometimes abrasion is made by new needles or sharp incisions. The term abrasion means, that you cut or scrape off a small area of epidermis from the surface of the skin. Now, the usual instruments we employ, and which I wish to show, are lancets, needles, rakes, and machines. I had better show you first some of the instruments that I do not approve of. Here is one, fitted with two needles. The other is made for sterlisation, and I think it is a very bad sort of instrument indeed. Here is a case where four ordinary needles can be fitted, and there is a little collar that moves backwards and forwards and fixes them in position. The four needles collectively have a diameter of something like five or six millimetres. The importance of this will be apparent as I proceed.

Here are two kinds of rakes—two specimens of Roze's instruments. Roze's instruments are made in two sizes. So far as I see, there is little difference between Roze's instrument and the instrument I have passed round. The only difference is that Roze's needles are fixed in a circle so as to make a circular laceration through the epidermis. Roze's instrument has a little spade at the end of it for rubbing on the lymph. Some are not fitted in this way; a great many are. It is a very popular instrument, and is often used by men who have not many vaccinations to do. They say, "I know if I use that instrument I won't do too much." As you see, these two instruments are made of different sizes, so as to make either a larger or a smaller mark. Here is another instrument, made to throw away. It is fitted on to a penholder, used once and then burned. Here is another form of instrument. This is a vaccinator which is supplied with this vaccinator's case, which I shall pass round. It also, I think, is a very extraordinary instrument. You will see there four needles. This is what is

called the "Association" instrument. What that means I do not know, unless it is the instrument favoured by the Association of Public Vaccinators in England. It has four needles set as close together as can be, and measuring across about four millimetres.

This is another rake, of six millimetres across. I consider, with the exception of, perhaps, Roze's instrument, all these instruments are simply barbarous for the purpose of vaccination. Still, I got them from a surgical instrument maker to-day, and he said they were actually bought. With regard to the sharp instrument which I use myself, and which I suppose the majority of you use, we have here a lancet made after the type of the bleeding lancet, which is, perhaps, the most perfect instrument for vaccinating that one can employ.

Here is another instrument, which is good in intention though not elegant in shape. It looks like a corkscrew, but it also is an instrument that anybody could vaccinate with. Then I send round the vaccinators' case supplied by Evans & Wormull. It is worth looking at. It has a tray for holding soda solution, in which the instrument is placed, and a gauze spirit lamp, with a neat stand, for the purpose of boiling the fluid. I send round the original instruments sent with it. They sent three of these things. I consider that these are equally barbarous with those I have referred to. They have five needles or prongs, collectively six millimetres across. They are far too large; you could do with two of them. I have had two of these instruments shaved off at the end, so that they can be used with two needles. These two needles have a diameter of 1½ millimetres.

Now, the importance of this will appear immediately. My own method of vaccinating is by means of a broad needle. I will show the newest form of broad needle; but the handle is far too long, and unless it is cut I could not use it. But, apart from that, it is not what I want. I like to see what I am doing. But the idea is to use this like a pen to write the abrasion on the skin, and make insertions of a certain area. Here are the instruments I am in the habit of using every day—one an old-fashioned occulist's broad needle, with a broad blade and sharp point. In the other the point is rounded and sharp, and I do

not like it so well as the other. Another point is, that the modern instruments are capable of sterilisation. There is no ivory or machinery about them. We have nothing like Roze's instruments, and we are able to produce our punctures or incisions without laceration. With these remarks, I may pass from the discussion of the instruments.

Now, with regard to the best method of operating, it is of importance to remember that you can make a vesicle of any shape or size you please; that is the foundation of successful operation. If you want vesicles of a regular shape, a regular size, you must keep your insertions regular in shape and size. Not only so, but they must be of a certain depth—so deep, and no more. It is said you must make incisions so as not to draw blood, but it is not said how deep or how large the incisions are to be. It may be a square line, or two lines square; well, that is four lines square. As the area increases as the square of the side, you may, by using some of those rakes or needles I have passed round, make a large area of laceration, especially if you scratch frequently over the same area. My first proposition is, that the area of the incisions is proportional to the area of vesicles produced. With a certain area, you can produce vesicles of a certain size.

I have shown cases of re-vaccination to-night. The secret of successful re-vaccination is not to re-vaccinate an adult more severely than an infant. That is not always carried out. I have evidence here to show that the re-vaccination of adults is not always carried out in this manner. But if you want uniform results in a series of re-vaccinations, you must vaccinate adults with the same care as infants; make no larger insertions than in the case of an infant, and the vaccinations will be uniformly successful. I draw attention to the vesicular character of the vesicles in the case I have shown—the regular size of the vesicles, and the absence of undue inflammatory action surrounding them. That case was on the eleventh day, at the very height of the disease, so I can say without offence that this result is due to the method pursued in making the insertions. The area of insertion that I make for adults and infants alike, is one square line for each insertion. The reason for that is, that you want to produce a vesicle, and you want to have a covering for

it. If you scratch away the epidermis which is to form the covering of the vesicle, you cannot get a covering. After having scratched off all the epidermis, you apply an irritant fluid, which is a vesicant when properly used and an escharotic when improperly used. The vaccination process commences by hyperæmia in the papillary body; and that causes exudation, which passes into the mucous layer of the epidermis, where it increases in the intermediate cells. Now, this exudation is kept under by the horny layer of the epidermis, and is prevented from extending unduly. It does not pass into the horny layer of the epidermis (the cells are too hard, and the horny layer of the epidermis does not lend itself to inflammatory changes), but it confines the exudation, and it spreads beneath it in a circular fashion from the point of insertion. In order to have the benefit of this horny layer of the epidermis, you must leave it. You must not scrape it off. If you scrape it off, you must only scrape it off to the amount of one square line. If you do that, I guarantee that you will get good vesicles both in adults and infants, no matter what material you use.

Now, we have had a general re-vaccination during the last two months, and I have had ample opportunity of ascertaining the usual method of vaccinating in Edinburgh. I have a report of more than 1600 vaccinations in the elementary schools of children under 14, and I find that, out of 1622 children examined, 800 were vaccinated with one mark, 735 were vaccinated by two marks, 43 by three marks, and 44 by four marks; and I think I myself and one or two others are responsible for most of these four marks. That shows that the usual Edinburgh method is to make one or two marks.

I wish to state that out of these cases I found 351 severe cases, making a percentage of 26·8. These were mostly cases of one or two marks. Remember, we are talking of children under 14, where you would not expect a severe result, and these results took place in children that were below 10, as well as above 10—as I say, under 14. I did not see any severe cases where four vesicles had been produced. Now, the insertion success per cent. was 82, and the case success was 80·5. So that, you see, the results of the general re-vaccination carried out in Edinburgh show that, whether you look at them

from the point of view of the number of cases done or the number of vesicles produced, 80 per cent. is about the amount of success. With regard to the severe cases, it shows either that the protection given in infancy is of a very evanescent character, or that something may be wrong with the method of performance. I do not say there is anything wrong with the method, but I call attention to the fact that a great many of them did not show the normal progress of vesicle, and that the resulting scabs showed an enormous size of vesicle. I show you here the gauge by which experts calculate a good vaccination. Here is the amount, one mark equal to half a square inch, which is a good protective vaccination for an infant. You may have two, three, or four equal to that, which is also good protective vaccination for an infant. I have found vesicles or scabs a whole square inch in area, or two of these—double the quantity you want for even primary vaccination. Why is this? My feeling is, that it is due to the large amount of abrasion or insertion—that the vaccinators may not be careful to preserve the epidermis so as to be able to produce a vesicle. I simply show you these instruments, and ask you, as sensible men, whether, if you use these instruments, you are not likely to produce an abrasion of perhaps 6 millimetres square, or 36 square millimetres. It is quite likely you would. Some men scratch one way, and others scratch another way; but a good many men use the method of making a "good old-fashioned scrape." Now, with this method you cannot produce normal vaccination, and with glycerinated calf lymph you are certain to produce severe vaccination in unprotected persons.

I will now call your attention to the lymph ejector. How many men in this society use a lymph ejector, or sterilise their lancet before they begin? Of course, it is a common enough practice. Here is the way to use the lymph ejector The ends are broken off and the tube is inserted into it, and when the incisions are made the lymph is simply blown on to the skin—quite a simple proceeding.

Another point is, that we are told it is necessary to dress the arm, and some men have carried dressings to the point of abuse. I do not say they have not high authority for

doing this; but I tried dressing twenty years ago, and I found you could not keep a dressing on an infant for a week. The mother, finding it got dirty, had it removed, and put on the vaccination the dirtiest piece of wool to be found in the rag drawer, so I gave it up. If I prescribe dressing I do so in the second week, in the shape of dry powder. Sometimes I put a little iodoform on the vesicle if the areola is very conspicuous. I also use zinc powder and emol keleet, and find they do very well, when rubbed in gently night and morning; but the idea of putting on a dressing of antiseptic wool is, I think, erroneous. I do not object to a dressing of sterilised moist lint without any antiseptic, but it should not be applied too long. It should in my opinion be applied for twenty-four hours, and then taken off. But I have seen dressings continued for weeks after a vaccination. There is no doubt a dressing of cotton wool, antiseptic or otherwise, besides interfering with the normal action of the lymph, is apt to interfere with the normal course of the disease, because it acts as an incubator, and you have accelerated vaccinations. Then again, shields of all kinds are very objectionable. They do not protect, though you may find an adult with a large cage on his arm quite happy, but as a rule they do more harm than good.

With regard to the vaccine materials we use, I wish to divide them into two classes—an unadulterated material got either from the infant or from the calf, which is used without dilution or mixture of any sort at all, and to compare it with glycerinated calf lymph. I showed long ago[1] that vaccine lymph is simply plasma containing spores, and spores of a resistent nature.

Animal lymph, which I have not had an opportunity of examining, I consider something of the same nature, and it can be used quite as freely. It is said, that if you mix animal lymph with glycerine it keeps it. There is a fallacy in the word "keep." Glycerine keeps lymph from putrefaction, but it does not keep it active. It loses its activity. I will show you why. I use glycerinated calf lymph now, and I find I cannot keep it active for more than a month. It will not

[1] *Vaccinia and Variola*, 1886.

produce 95 per cent. of insertion success if kept more than a month. It must be kept in a cool place, and should not be carried about in the pocket, as most people have the habit of doing.

About sixteen years ago, I took lymph direct from two calves which I sent to the Animal Vaccine Establishment to be vaccinated by Dr Cory for experimental purposes. When they came back I took lymph from them, and kept it for six months in tubes of large calibre without special care, and I tried it at my station six months afterwards, and it produced admirable results. I took it by pinching up the vesicles, removing their covering, and allowing the lymph to exude. The lymph we now use is mixed with glycerine and water in the proportion of 1 to 4; 20 parts lymph, 40 parts glycerine, and 40 parts water. This glycerinated calf lymph has not the keeping power of the unadulterated, unmixed lymph that I have just described, and I do not believe its protective power is so good. In support of this belief, I draw attention to the statistics I have given, that 80 per cent. of children under 14 could be successfully re-vaccinated, and a great number of these were under ten years of age; so that periodic general vaccination has become necessary.

There is only one other point, and that is, to call attention to the escharotic action of vaccine materials in unprotected persons. Lymph properly used is a vesicant, but if it is used on a large raw surface it has the same effect as a second application of iodine to a raw surface. It produces a necrotic condition in the centre of the vesicle, by which a slough is produced, which causes a punched-out hole in the skin, which takes a long time to heal. I have seen many such cases during my inspection of the Edinburgh elementary schools, 31 in number, and also coming from Glasgow, and they look bad indeed. This may be due to the fact that this irritant material is applied to a raw surface. I call attention to the structure of the papillary body of the epidermis. You have a vessel with slow side current from the ordinary flow of blood through the vessels of the true skin, and when hyperæmia takes place in the papillæ we have an exudation which rapidly forms a great number of leucocytes, which cause compression of the vessels,

and we have necrosis from stoppage of the blood supply to the centre of the vesicle. I think it is of the greatest importance that lymph should not be applied to raw surfaces, in unprotected persons, but should be applied in the careful manner I have described.

Dr Haultain said they had to thank Dr Buist for having brought up this practical and instructive paper at a time when they were all interested in the subject.

Dr Ritchie said he thought they were indebted to Dr Buist for bringing up this subject, and he had been much interested in what he had said. He supposed he used vesicant "escharotic" in a peculiar sense, because, if they applied the lymph to a protected patient, even if they made considerable scratching, they got no escharotic action. It was only if the vaccination took that they got a peculiar kind of inflammation. He thought that unfavourable results when they occurred were generally not due to the lymph, but to the condition of the skin or the constitution of the patient. Dr Buist, perhaps through an oversight, had said nothing about the cleansing of the skin before the operation. That was of the utmost importance, more especially in adult patients. He believed that some of the very acute results seen after vaccination were due to the inoculation of germs pre-existing in the skin, and not due to bad lymph. In cleansing the skin, he did not trust the patient, but tried himself to rub off more or less of the scarf skin, so as to make the skin thoroughly clean. Unfavourable results were occasionally due to injury to the pock. He vaccinated a large family; they all did well except one young lady, whose arm was progressing satisfactorily, and the inflammation was subsiding, but during the second week she played lawn tennis, fell, and injured the shoulder, after which severe inflammation set in. He had used the same lymph to all the family, but when this young lady fell, one or more of the pocks were broken up, an absorbent surface was created, and "dirt" had got into the wound, causing suppuration. He supposed therefore that Dr Buist used the terms "vesicant" and "escharotic" in a peculiar sense, and not in the usual

sense when applied to the results of ammonia or vesicant fluid. He had to vaccinate 97 children in one school between the ages of 10 and 14. Every one took, and only two had arms at the end of the week which he had to recommend to be put in slings. The boys were brothers, and there had been some hesitation about admitting them to school, as they were delicate. He would not enter on the question of constitution, with poor resisting power that tended to make vaccination worse. Recently he had 129 children to vaccinate in a school; 23 had not good pocks. He re-vaccinated them, but not one of them took. Dr Buist had said he thought that because children could be re-vaccinated at the age of 10 or even under 10, that was an evidence that glycerinated calf lymph was less protective than the other. Now, they all knew how very favourable were the results of vaccination and re-vaccination in Germany. He thought that they had not used glycerinated calf lymph from the beginning; recently, however, they had, and all the children there were re-vaccinated at the age of 12, with the result that whereas smallpox was common, it is now of very rare occurrence. He had used glycerinated calf lymph ever since it was introduced—in fact, for twenty years he had used nothing but calf lymph. At the commencement of this year he re-vaccinated many persons whom he had vaccinated seven years ago. He found that very few of the adults he re-vaccinated took. When we remember how very liable some are to take infectious diseases, we are not justified in concluding that because a few re-vaccinated adults took, therefore glycerinated calf lymph is ineffectual. The reason why children re-vaccinated so well, was that the vital changes took place quickly, and they lost the protective power of the early vaccination; but in the case of adults the protective power lasted a much longer time. He agreed with Dr Buist so far as to dressing He did not think cages were of much use. He agreed that the glycerinated calf lymph did not keep nearly so well but he was glad that calf lymph was used now instead of humanised lymph. One of the best proofs of that being a distinct advantage, was the increased number of vaccinations

that had taken place since there had been legislation on the subject. Lord Lister in the House of Lords at first had objected to the bill, but he agreed to it after having received the assurance that a re-vaccination bill would be brought in. Contrary to expectation, the number of vaccinations of infants had tremendously increased since the compulsory clause was deleted, because people were not afraid of having diseases transmitted through the use of calf lymph. He made only two marks, and so came under the ban of Dr Buist. He should say they were quite up to Dr Buist's standard as to size, and it was the rarest thing to get any bad results.

Dr Connel said that the thorough cleansing of the skin could not be too strongly insisted on. He used 10 per cent. solution of lysol, and he used a clean needle and made parallel scratches. He had not found any ill effects. He had seen pretty severe effects in adults, but never erysipelas. He had seen escharotic action; he must bear out Dr Buist in that. He was much impressed by Dr Buist's remarks on not entirely scraping off the epidermis. He must plead guilty to using only two parallel scratchings. He never did more, and he did not see the absolute necessity for four. He had sympathy with the conscientious objections of the mother who did not like to see four marks on the arm, and if two were sufficient they could not insist on any more.

Professor Stephenson said the difficulty in his mind was that there were so many imperfect statistics and so many fallacies into which they might fall, that it was very difficult to arrive at anything like a scientific conclusion. Taking the remarks that Dr Buist made, there had not been conveyed to his mind an assurance that the results of four vaccine marks were any better than those attending two or one mark. Dr Buist had quoted statistics concerning schools in which there was something like 80 or 90 per cent. of cases where re-vaccination took. These were divided originally into those having one, two, and three marks, and he mentioned how many there were of each; but, unfortunately, the information did not indicate whether the re-vaccinations were more or less severe according to the different number of vaccine marks. To his mind, protection depended less on the number of marks or the size of the vesicles altogether as

on the amount of the inflammatory process round the vesicles. That was where the process went on that protected the system. At the time of vaccination, the proper test whereby to estimate the thoroughness of the operation was the thoroughness of the induration round the vesicles. If they had two good marks, or even one, with good infiltration of the skin around, that was quite as good as having large vesicles, or a great number of vesicles. That point had been referred to in some of the literature of vaccine; it was certainly not new, but has been too much lost sight of. He had one good proof of that in a case where a lad had infantile eczema. From one reason or another they postponed his vaccination till he was 16 years of age. He was vaccinated twice with calf lymph without effect. On a third trial, some months after, two tiny vesicles appeared, one very imperfect, the other typical, but very small. There was, however, considerable induration around. During the recent epidemic he was re-vaccinated along with a brother, out of the same tube of lymph. The brother took well; he, not at all. From a single tiny vesicle, which barely left a mark, he had obtained immunity for the time being. Dr Stephenson further referred to his own personal history. He could scarcely recognise where his vaccination marks were. There were just two spots where he thought they might be, but they certainly were not typical. He had re-vaccinated himself several times, but never took a second time, and had seen four epidemics of smallpox. He had observed the same result in several cases of very doubtful marks. Re-vaccination he considered advisable whenever there was an epidemic. After any considerable interval, they could never be certain that they were perfectly secure. If smallpox were about, they should be re-vaccinated; if they were secure it would not take, if it took they had the assurance they required vaccination, and were again proof against the major evil. With regard to the method of introduction and instruments, he had never used anything else than his old lancet, and there was nothing better than making a mark, by scratching, about the size Dr Buist suggested. Two vesicles were all he ever produced.

Dr Rattray said he had been very pleased with the suggestion that before getting vaccinated the patient should have his arm

washed. He had adopted that plan from the beginning, and he had also made a point of making only two marks with the point of the lancet. Of all the cases he had vaccinated at Portobello, only 3 per cent. failed, and this he thought was due to carelessness on the part of the patients. There was a family he vaccinated from the same tube. The father, coming home from business, got his arm injured against the door of the carriage, and it inflamed very much. The mother said to the doctor that he had used bad matter. He replied that was impossible, because the matter was taken from the same tube with which the whole family was vaccinated. He applied two or three remedies to the arm. The only one he found of any use was red lotion. There was a good deal of proud flesh round the inflamed part. That was reduced by blue-stone. In due time the arm recovered, and he gave the patient a tonic. He could not sufficiently thank Dr Buist for his most admirable remarks and the information he had given on his most important subject.

Dr Keppie Paterson said that the statistics of the London Smallpox Hospital showed distinctly that the more the number of marks on the arm the fewer were the cases admitted into the hospital, and that the slighter was the disease. There was, therefore, something in having an increased number of marks on the arm in the way of increasing the protective power against smallpox.

Dr Ritchie said that the last speaker reminded him of the problem as to whether white sheep or black sheep ate most. As matter of fact, there was an infinitely larger number vaccinated with two marks, therefore a much larger proportion of them came to the hospital. There was a very small number with five marks appearing in the hospital, and it might be argued from that that the protective power of five marks was much greater than that from any other number.

Dr Keppie Paterson said that in London and elsewhere a large amount of vaccination was done at the public vaccination stations, and the Government Board demanded four marks before the grant could be earned.

Dr Webster said they had all been anxious about vaccination during the last two months, and it was interesting to have an authority giving them his opinion on the matter. Vaccina-

tion seemed a simple matter; but when they came to do it this time, and had so many questions asked by patients, it forced them to read, and in reading up the matter one found there was no very clear evidence why there should be three or four marks. It seemed to rest on uncertain ground, so far as he could make out. So he, he supposed along with others, acted on the principle that if one mark did not take they applied three at two different places, and a small area was quite sufficient; and certainly one good rule was, not to draw blood. He had acted on that principle during the last two months, and he thought it was a good rule. It did not offend the patient, or cause a dribble of blood down the arm. A very good practice was to put a little ring of collodion round the vaccination mark, and a little penny size of cotton wool. The wool covered, but no collodion cemented the centre. That was sufficient to send the patient away happy, and more expeditiously than if you waited for the part to dry, and they felt assured that the clothing would not come in contact with it. He thought there was no difference whether the arm was washed or not. He never knew of any case go wrong on that score, but he always took the precaution to take the sterilised, not the medicated, wool and thoroughly rub the part.

Dr Dewar asked Dr Buist how much lymph he placed on the arm, and how many vaccinations he made out of one tube?

Dr Buist.—A whole tube; small insertions, but plenty lymph.

Dr Dewar.—Does that make a difference to the violence of the inflammation?

Dr Buist said it did not. Large abrasions and small lymph would give escharotic action. They could not limit escharotic action by applying a small amount of lymph. He always used a whole tube to each case.

Dr Dewar said that was a case where the opinion of the Society would be very important. He found that the same quantity which he could use once would vaccinate four, and give good results, so he thought it was a matter where they must not be bound to this or that mould. The point was to get vaccine into the blood of the infant, and of course, according

to the law of multiplication of the lower organisms, why should not one vaccine spore produce a million?

Dr Hunter said he wished to ask the Fellows of this Society if they had vaccinated by first blowing the lymph, and scratching and inserting. He had made that a practice for a good many years, and thought the lymph was introduced into the circulation more certainly. As to not drawing blood—that was a relative term—he would not recommend to draw blood to the extent of running down the arm, but their excision should make the red tint appear; they should just see it without running. He had not the neat apparatus that Dr Buist brought before them; but if they first blew on the lymph, and used the old lancet which Dr Stephenson spoke of, and which he thought was the best instrument, making small incisions to the extent of a line, two marks, one got the lymph introduced into the circulation with extremely little trouble.

Dr Fordyce asked, if Dr Buist used a whole tube, did it not take an unconscionable time to dry on the arm, and keep the patient waiting a long time? If there was any method of hastening the method of drying glycerinated calf lymph he would like to try it.

Dr Haultain said that before calling on Dr Buist to reply, it seemed to him there was a great amount of difficulty in estimating what exactly caused immunity. They wanted to know from Dr Buist, who was an acknowledged authority on the subject, by what means immunity was acquired. Was it by the number of vesicles, by the superficial area of those vesicles, or by the amount of actual lymph which was injected?

Dr Buist said he must thank the Society for the kindly way in which they had discussed his paper, and he could assure them that nothing was further from his thoughts than to attempt in any way to dictate to members of the Society how or when they should vaccinate. With regard to Dr Ritchie's remarks about washing the arm, he would say that if the arm required washing he always washed it. He thought that was perhaps a thing that might safely be left to the patient. In any event, he objected to washing with lysol or any antiseptic

solution. He used boiled water and sterilized wool, not an antiseptic wool. He did not wish an antiseptic within one hundred miles of any vaccination he performed, because antiseptics interfered with the normal action of lymph. When he was working at vaccination he could produce 100 per cent. of success with arm-to-arm lymph. Under carbolic spray his insertion success was 25, and the character of the vesicles was sadly below the mark. With regard to the escharotic character of the lymph, of course lymph was only active in unprotected persons. The subject of his paper was the "Art of Vaccination"—how to produce the vesicle, how to prevent the eschar. He did not say that Dr Ritchie ever produced an eschar; a great many of them did not. He knew the men who produced the eschar; he had seen them, and he must say that he did not, so far as he could see at present, find any Fellow of the Obstetrical Society who produced it.

Dr Ritchie.—I am sorry I have done it.

Dr Buist said he did not accuse him at any rate. He had been asked, what was the advantage of four marks over one or two? That was the whole point of the paper. He said he did not care how much lymph he used. What he cared about was the area of his insertions, and he would draw any amount of blood they pleased; he would wipe it off again. He waited till the blood ceased to flow, then he rubbed one tube of lymph into the four insertions. He got about 95 per cent. insertion success in primary cases, 89 per cent. insertion success in re-vaccination. Working with stored lymph, 90 per cent. of success was a very good result. They wanted to know the vaccination equation. The vaccination equation was that, with one tube of lymph and four separate insertions of a square line each, they could produce four vesicles collectively equal to half a square inch. It did not matter whether all the insertions were together; if they produced a half square inch by one, two, or four insertions the protection was the same. There was no wish on his part to dictate to them. What he wanted to convince them about was, that the one or two marks when done in a certain way gave as much protection as the four marks. What he complained of was that it was done sometimes, and in 25 per cent. of the school children it was done in such a way as to

produce the escharotic action. Now the escharotic condition was only produced in unprotected persons. Dr Connell misunderstood what he meant by escharotic condition; he meant the production of eschar during the third or fourth week. He did not mean that he observed diptheretic action the moment the vaccination was done. The object of his paper was to explain how primary vaccination and re-vaccination could be done with the greatest certainty and confidence to a patient, by the use of this method—by four insertions, and the use of plenty lymph. He had never any difficulty in getting the lymph to dry. If it did not dry in the four square lines of insertion, he let it dry on the skin; and as regards the blood, he wiped it off. In regard to the percentage of severe cases, he simply took the number of cases in the thirty-one elementary schools in Edinburgh. He inspected 50 children in each school —25 from 10 to 14 years of age, and 25 from 10 to 6—with the result that he found out of these children 351 severe cases. The point of his story was that he himself during the recent vaccination vaccinated over 880 cases, and he had no bad arms. His percentage of bad arms would be nothing. He wished them to contrast the two methods. Now, with regard to immunity, suppose you have a proper vaccination, the immunity produced by one vesicle is the same as the immunity of four, supposing the four are equal to the one. The area must be the same to produce the same immunity. One point I missed was that 80 per cent. case success in the elementary schools of children of tender age meant, notwithstanding the suggestion that children of tender age are growing and that their vital processes are more acute—that does not quite meet the case. What he felt was, that children of that age should not be capable of being vaccinated so severely. Probably 25 per cent. of these children were so unprotected that whatever method was employed which he was bound to consider was correct, the result was severe. Then with regard to Dr Hunter's question about putting on the lymph when they vaccinated from arm to arm, he never put the lymph on first. He was too careful to see that he made the incisions one line in length, and to cross them the same distance. If the lymph was there, he could not see what he was about; it was a case of mathe-

matical calculation. It was, as he said, an equation—so much scratch, so much vesicle. If the patient was unprotected, they were in danger of producing the escharotic action. By escharotic action he meant a slough in the centre of the vesicle, which cut out a piece of skin like a burn with red hot metal. If a spark of steel flew from a forge and hit a man on the toe, it would produce a small mark the size of a threepenny which would take two or three months to heal, the intensity of the heat causing necrosis of the mark. If they made too much abrasion they would have this escharotic condition. He wished the discussion to be confined to the art of vaccination—how to produce uniform results. He could not in the course of one paper answer all the manifold questions that vaccinators brought out, but he was much indebted to the Society for the kind way they had received him.

MEETING VII.—JUNE 12, 1901.

DR MILNE MURRAY, *President, in the Chair.*

I. The following were elected Ordinary Fellows of the Society:—R. P. Ranken Lyle, M.D., 20 Saville Row, Newcastle-on-Tyne; A. Girvan, M.D., F.R.S.C.E., Craigleith Poorhouse; F. W. K. Tough, L.R.C.P., S.E., Leith Hospital.

II. *Dr Berry Hart* showed (1) a LARGE FIBROID TUMOUR removed by pan-hysterectomy. The uterus was as large as an eighth months' pregnancy, and the operation was necessary owing to its bulk and the fact of menorrhagia. On sections they would see that the uterine cavity was long and sigmoid in shape. (2) AN INCOMPLETE TUBAL ABORTION. The gestation sac itself, 2 inches by 1½ inches, was attached by its one pole within the fimbriated end of the tube, the outer half projecting beyond the tubal end. The part in the tube was adherent to the tube wall in more than half its extent. The amniotic cavity was well seen, and the sac-wall, averaging ½-inch to ⅞-inch, on

section had a good deal of blood extravasated in it. It was impossible to settle, until a microscopical examination had been made, whether there was really an incomplete tubal abortion or a tubal gestation partially developed in the fimbriated end of the tube. (3) A PAROVARIAN TUMOUR with a markedly twisted pedicle. The ovary could be seen at one part of the tumour. There were general adhesions to bowel and mesentery. (4) A RUPTURED OVARIAN CYST from a girl of 14. This patient was in Ward 36, waiting for operation, when the cyst burst at 3 A.M. It was removed twelve hours afterwards. The perforation could be seen, and also a second incomplete one showing the peritoneal coat lacerated but not the deeper part of the wall. (5) A LARGE PAPILLOMATOUS CYST, one of two specimens of the same size removed from the one patient. The papillomatous growths were on the surface of the tumour. The general peritoneum was unaffected, and he removed them, without tapping, through a large incision. (6) PART OF A LARGE SEMI-SOLID OVARIAN TUMOUR, WITH MYXOMATOUS AND CYSTIC PARTS, the latter lined by columnar epithelium. There was a large amount of ascitic fluid. Dr Hart also showed a DRAWING of the tubal abortion, and for comparison a drawing of a peritoneal tubal rupture, from a fine specimen in Dr Harvey Littlejohn's museum.

III. *Dr R. C. Buist* showed a UTERUS with deciduoma malignum after hydatid mole (with microscopic sections).

IV. *Dr Haig Ferguson* showed a FIBROID TUMOUR OF THE UTERUS which he removed by abdominal hysterectomy a week ago. The tumour was made up of four separate portions, spreading out in a dendriform fashion. The condition was not definitely diagnosed before operation owing to the unusual physical phenomena. The patient is 55 years of age, and her chief complaint was constant sickness. The sickness somewhat resembled that of pregnancy, although not confined to the morning. She was losing weight at the rate of about 2 lb. a week after admission to hospital. The bowels were constipated and required an aperient every second night. There was no frequency of micturition or polyuria. No history of menstrual disturbance could be ascertained. The menopause came on a

the age of 45, during which time the patient was very well.

There were apparently four separate tumours to be felt in the abdomen. The largest was on the left side, and felt much like an enlarged spleen, extending from the left hypochondrium almost down to the umbilicus; another was in the right lumbar region, was very hard, and seemed to lie deeply behind the peritoneum. (The patient stated that she had felt this swelling on the right side for sixteen years.) A third tumour was felt above the pelvic brim in the hypogastric region, and a fourth seemed to extend up from this into the left iliac region.

The hypogastric tumour was quite definite, and dull on percussion. The right lumbar tumour was also definite on account of its extreme hardness, but had intestines in front, as also had portions of the other two tumours. The rest of the abdomen was tympanitic, and there was no evidence of fluid in the peritoneal cavity.

On *per vaginam* examination nothing could be felt in the pelvis, it was only just possible to touch the tip of the senile cervix.

The diagnosis come to by Dr Elder (under whose care the patient had been for some weeks) and Dr Ferguson was that the hypogastric tumour was probably a fibroid of the uterus, and that the other tumours were probably omental. (The tumours were evidently increasing in size.) The patient was transferred to Dr Ferguson's care, and on opening the abdomen he found that the apparently separate tumours consisted in reality of one tumour, which, with the exception of the hypogastric portion, had intestine more or less in front of it. The most prominent part of the mass in the left hypochondrium was not covered by bowel. The hard mass in the right lumbar region was the uterus itself, the seat of an interstitial fibroid, the whole mass being almost completely calcified, and so hard that a knife makes no impression on it. The other parts of the tumour had undergone no degeneration. The peritoneal cavity contained a little free fluid. The whole tumour was removed, and the patient made a rapid recovery, her sickness ceasing entirely.

The points of interest are:—

1. The impossibility of complete diagnosis, owing to the

intestinal relationship, absence of pelvic signs, and unusual shape of the tumour.

2. The continued growth after the menopause (patient's age 55), and after the portion of the tumour had undergone almost complete calcareous degeneration.

V. *Dr Barbour Simpson* showed for *Professor Simpson* (*a*) EPITHELIOMA OF CLITORIS; (*b*) REPLICA OF THE PORRO MEDAL struck to commemorate the jubilee year of the Porro-Cæsarean section.

VI. *Dr Macvie* showed COLOURED PLATE of distended veins of left leg in a patient five months pregnant.

VII. ECLAMPSIA AND THE THYROID GLAND.—A PRELIMINARY COMMUNICATION.

By H. OLIPHANT NICHOLSON, M.B., Physician to the New Town Dispensary, Edinburgh.

SUMMARY:—

1. The changes in the blood and circulation in pregnancy.

2. The toxæmia of pregnancy and its bearing upon eclampsia and coincident anuria.

3. The state and functions of the thyroid gland in pregnancy.

4. A case of eclampsia treated by extract of thyroid gland.

5. The relation of the thyroid gland to eclampsia as seen in its bearing upon the pre-eclamptic symptoms of:—

(*a*) Œdema.
(*b*) Albuminuria.
(*c*) Diminution of urine.
(*d*) High arterial tension.
(*e*) Headache, diarrhœa, eye conditions, etc.

6. The evidence that defective action of the thyroid may and does produce these symptoms, culminating in eclampsia, including:—

(*a*) The action of iodothyrin.

(*b*) The diuretic effect of thyroid juice.
(*c*) Its antagonistic action to supra-renal extract.
(*d*) Its influence over urea production.
(*e*) Its effect on the liver.

7. The treatment of eclampsia and the pre-eclamptic state by thyroid extract.

Before discussing the relationship that may exist between thyroid function and the eclamptic state, we may shortly describe the changes which occur in the blood and circulation on the supervention of pregnancy.

The Changes in the Blood and Circulation in Pregnancy.

Profound changes occur in the quantity and quality of the blood in response to the altered conditions incident to pregnancy. There is an increase in the volume of the blood with a deficiency of the solid constituents of the serum, leading to a lower specific gravity. A more detailed examination shows that the red corpuscles and albumen are relatively diminished, while the number of white corpuscles is increased.[1]

There is also a relatively greater amount of water and of fibrin in the blood. These changes are admirably adapted to fulfil the requirements of the circulation at this time, for the vascular area through which the blood has to be pumped is now greatly increased, and the ventricle will accomplish its work more easily with diluted blood.

But the changes in the blood of the pregnant woman which concern us most are of a different nature. There is always a *toxæmia* as a result of the fœtal metabolism. The maternal blood being in close proximity to the fœtal blood, must undergo considerable alterations—excrementitious materials from the fœtus must be taken up, while on the other hand, it will lose certain of its constituents which the fœtus is capable of picking out and storing up in its body. As pregnancy advances the maternal blood will suffer to a greater extent, as the amount of fœtal excretion will be larger. There is the possibility also,

[1] This is one of the first blood changes which follow thyroidectomy. It is not impossible that some degree of thyroid inadequacy may be a factor in producing this modification of the blood in pregnancy.

that certain diseases of the fœtus itself may tend to augment the toxic output into the maternal blood. Therefore, towards the end of gestation, when the toxæmia is most pronounced, the margin of safety to the mother is greatly contracted. Unsuitable diet, chiefly of the proteid class,[1] a sudden chill, and a variety of other circumstances, may be sufficient to derange a mechanism now taxed to its utmost, and precipitate the dreaded symptoms of eclampsia.

Coincident with the blood changes of pregnancy there is a hypertrophy of the cardiac muscle and of the muscular coat of the blood-vessels, giving rise to increased vascular tension. Until recently this hypertrophy was regarded as a natural sequel to the increased quantity of blood in the circulation, and to the wider area through which it had to be driven. It was therefore believed to be of a compensatory nature, and to this circumstance the freedom from accidents during chloroform anæsthesia in labour has been ascribed by some. That there is seldom true compensation resulting from this hypertrophy is evident to anyone who has noted the condition of matters in the circulatory system on the supervention of pregnancy. If dyspnœa and palpitation on exertion existed previously, these are now markedly accentuated, showing that the heart has less power of responding to a demand for increased work. This would seem to be the real test of compensation—not what a heart can do under ordinary circumstances, but what degree of reserve power it possesses. Dr James Mackenzie (1) has drawn attention to this matter, and adduces several reasons—among others, the not uncommon appearance of a venous pulse in the neck during pregnancy, to show that the hypertrophy is in no sense compensatory for the conditions of the circulation existing at this time. Some observations which I have made with the sphygmograph on pregnant women in different postures, confirm this view. There is a more marked quickening of the pulse and a greater fall in blood pressure on assuming the upright position than one usually finds in the non-pregnant state.

Clifford Allbutt (2) has suggested that the increased blood

[1] The thyroid has a most important function in modifying and destroying proteids.

pressure during pregnancy is dependent upon the toxic condition of the blood. I think it not unlikely that the hypertrophy of the heart and blood-vessels is due to the same cause. The subjects of chronic uræmia, and those who suffer from a certain form of paroxysmal dyspnœa, which is associated with arterio-sclerosis, are examples of the continued irritative effects of toxins upon the blood-vessels. Dr William Russell (3) has shown that in these cases the thickening of the arterial tube is mainly due to an increase in its muscular coat, and to a fibrous hyperplasia of the intima.

The Toxæmia of Pregnancy and its Bearing upon Eclampsia and Coincident Anuria.

The toxic theory of eclampsia is now the one generally held by most obstetricians, and in this connection the following points may be mentioned:—

1. That in every case of pregnancy more or less toxæmia exists, and that the blood intoxication becomes more profound towards the end of gestation.

2. That although the eclamptic state is due to a toxæmia, the toxic agent which excites the convulsions is probably not always the same—there seem to be different types of the disease.

3. That the toxins may be produced in greater abundance in some cases (twin pregnancies), and that they are generally more virulent in primiparæ than in multiparæ. In the primipara mechanical pressure on the renal vessels may possibly come more into play, while in the multipara a certain degree of immunity against the toxin may have been acquired from prexious pregnancies (Allbutt).

4. That, in spite of very grave toxæmia, no alarming symptoms will occur so long as elimination by the kidneys is sufficiently active.

Of the nature of the toxins we know nothing, and there is no clear evidence to show where they are formed. There is some reason to believe that the fœtus plays an important part in their production, because after its death the various symptoms usually abate. If the fœtus contribute a part of the poison, then it is unlikely that we can exert any control over

its formation, so our efforts in the avoidance of eclampsia may be more usefully directed towards the maintenance of efficient renal function.

A checking of elimination by the kidney, more or less suddenly produced, will result in the development of all the symptoms of eclampsia.

Therefore the whole question of treatment, prophylactic and otherwise, turns upon elucidating the cause of this renal arrest. What is it that, during the course of the normal elimination of the toxins, suddenly throws the kidney out of gear?

It is my object to bring forward some evidence to show that, in certain cases of eclampsia, there is an intimate relationship between inadequate function of the thyroid gland (diminished supply of iodothyrin) and the mechanism which arrests the renal secretion.

The State and Functions of the Thyroid Gland[1] *in Pregnancy.*

Last September, Dr Ballantyne in talking with me about the normal enlargement of the thyroid gland in pregnancy, mentioned some very suggestive points from a paper by Lange (4).

This author noted twenty-five pregnancies in which the usual hypertrophy of the thyroid did not occur. In twenty of these there was albuminuria.

Large doses of thyroidin were administered to pregnant women in whom the physiological enlargement of the gland had occurred. A marked diminution in the size of the gland resulted.

One may therefore conclude that the normal hypertrophy of the thyroid gland in pregnancy is the result of a demand for extra secretion to meet the wants of increased metabolism. With a continuous supply of artificial secretion the gland is relieved of the additional strain, and resumes its former size. Hallion (5) observed similar effects, and Murray (6) has, on this hypothesis, used thyroid extract in certain cases of goitre with marked success. Lange also gave thyroidin to a case where there was a pathological enlargement of the thyroid gland during pregnancy. A diminution in size again resulted.

[1] Under the thyroid gland, it is to be understood that the parathyroids are included.

He states that the exhibition of large doses of thyroidin to the mother are not contra-indicated, and that no atrophying effects on the fœtus are noticed.

One other point in Lange's monograph is worth mentioning here, as it has some bearing upon the subject of this paper. He used iodothyrin in patients suffering from the nephritis of pregnancy, and found that it had a distinct diuretic effect. It did not greatly diminish the albuminuria.

It occurred to me while meditating upon these statements, that there may be a possible connection between puerperal eclampsia and the thyroid gland. At this time I could not even frame a theory to suggest how the gland participated. A series of observations made with the sphygmograph on five cases of eclampsia, and some others taken in cases of myxœdema and cretinism—in the latter before and after thyroid treatment, afforded some matter for reflection. I decided that I would supply my next eclamptic patient with some artificial thyroid secretion.

At the end of September last I had the opportunity of doing so, through the kindness of Dr Elmslie Henderson of Kirkcaldy. Before I proceed to discuss fully what I believe to be the probable rationale of this mode of treatment, I shall give a short account of the case which Dr Henderson has sent me.

Case of Puerperal Eclampsia treated by Thyroid Extract.

Mrs L., æt. 32, in August 1900, engaged me to attend her in her third confinement. She was then five months pregnant. She volunteered the following information:—Her first child was born six years ago. She stated that her face, hands, and feet were much swollen before the child was born, and that on a Wednesday night she complained of severe headache, giddiness, blindness, and sickness with vomiting, after which she remembered nothing until the following Sunday. Her child was born on the Saturday night. She believes she had "convulsion fits." The child was dead.

When engaging her medical attendant for her next confinement, he elicited this history, and forthwith put her on a

restricted diet, and, when symptoms of eclampsia began to appear, administered chloral and bromide. She suffered from eclamptic seizures at this, her second confinement, but to a less degree than at her first. Her second child was born alive. At the time I first saw her (August 1900), she was in good health, an active, intelligent, and robust person. The urine was normal. I advised her to abstain from butcher meat. I saw her from time to time, when, towards the end of September, she complained of being drowsy and "feckless" in her domestic duties, of frontal headache, of giddiness and dimness of eyesight. Her whole body and face were œdematous and puffy. The urine contained albumen. I advised her to keep her bed, put her on a milk diet, and gave her a simple diuretic mixture.

Matters continued in this state until 3rd October, when I was hastily summoned to her, as she had had a "fit," was "queer kind," and unable to recognise her friends. I found her in a semi-unconscious condition, gazing fixedly into space. She appeared to me as ready at any moment to have another eclamptic seizure. I administered chloral and bromidia by the rectum, after which she fell into a sound sleep. There were no signs of commencing labour.

It so happened that, on the same day, while discussing this case with Dr Nicholson of Edinburgh, he suggested the use of thyroid extract. Being impressed with his rationale of this treatment, I decided to give it a trial.

The same evening Mrs L. had regained consciousness, but still complained of severe headache, of drowsiness, and of dimness of vision. Her urine was very scanty, and was solid with albumen on boiling. Sphygmographic tracings were taken from both radial arteries with great difficulty, owing to the swollen condition of the wrists. They indicated a contracted vessel and a pulse of high tension.

On 4th October the thyroid treatment was commenced, the dose being a 5-grain tabloid (B.W. and co.) twice daily. All other medication was stopped. The milk diet was still adhered to. In three days' time she was having three such tabloids daily. On 10th October improvement became noticeable. Her headaches were less severe, and her eyesight not

so blurred. The swelling of the face and body was much reduced, the quantity of urine had increased, while the albumen was diminished in amount. Other articles of food in addition to milk were now allowed.

On 19th October the improvement was more evident. She said she felt herself again, and besought me to let her get up. The urine was still further increased in amount, and contained much less albumen. The œdema of the face had greatly diminished, and the arms felt softer.

On 25th October she was able to engage in her household work. She still complained of headaches occasionally, but the giddiness had disappeared, and her vision was nearly normal again. She seemed physically, and especially mentally, more alert. The urine was normal in quantity, and contained no albumen.

The improvement was maintained. On 6th November she gave birth to a full-sized, living male infant; this achievement being accomplished without a single untoward symptom. She made a rapid and uneventful recovery, and now enjoys good health.

The thyroid extract was continued until ten days after her confinement. The albuminuria never returned.

Here is a patient who exhibited all the symptoms of the pre-eclamptic stage, and who had at least one typical fit nearly five weeks before the commencement of labour. The alarming symptoms subsided entirely, and she was delivered normally at full time of a living child. It might be argued that this was a mild type of the disease, where rapid recovery would occur without any treatment. This is certainly not the usual course of events, however, when the child remains *in utero*, and one does not expect the œdema and albuminuria to steadily disappear when matters have proceeded so far as to produce a convulsion.

At any rate, the gratifying termination to symptoms of a very threatening character under this treatment led me to investigate the subject more fully.

The Relation of the Thyroid Gland to Eclampsia as seen in its Bearing upon the Pre-eclamptic Symptoms.

In working out the relationship of thyroid gland to eclampsia, some of the more prominent pre-eclamptic symptoms may be considered.

Œdema.—First with regard to *œdema.*

This is sometimes an early symptom, but it is not necessarily marked. It may come and go during the later months of pregnancy. But in some instances the œdema is a most striking feature, to which, I venture to think, sufficient attention has not been directed.

Many practitioners must have repeatedly observed the existence of extensive general œdema during pregnancy without a trace of albumen in the urine. It may be present in patients who go safely through their term of pregnancy. But I have been particularly impressed with the character of the œdema in certain cases—some of these developed convulsions and others did not.

The œdema was general, but was not of the kind seen in ordinary dropsy. It was of a much more solid character, and only pitted on firm and prolonged pressure. The subjects of this œdema appeared to have put on fat during pregnancy. The arms and hands were uniformly thicker, and the wedding-ring was embedded in the swollen finger. The face and neck specially arrested attention. The whole physiognomy was profoundly altered, all traces of former beauty being obliterated. The face was chiefly swollen in the eyelids, nose, and lips. The nose was ill-defined, the bridge broadened, and the alæ nasi greatly thickened—this was, perhaps, the most striking peculiarity observed. The swelling of the whole neck was very noticeable, and that of the arms was of such a solid character that one could with difficulty pinch up a fold of skin. The extraordinary thickness of the abdominal wall from œdematous infiltration, noted in one of the eclampsia cases, led one to suppose that the uterine tumour was unusually large. But after delivery the contracted uterus could not be defined, and then the true nature of the swelling was appreci-

ated. It is noteworthy that the usual abdominal striæ were entirely absent in this case.

I would suggest that œdema of this kind is really of a myxœdematous nature. If it be present to a marked extent, some degree of thyroid inadequacy is probably indicated, but, in the absence of other abdominal symptoms, it may forebode no evil. Thus I am certain I have observed this type of œdema in cases of normal pregnancy, but there was no albumen, and, what was more important, no diminished quantity of urine.

Albuminuria.—Next, with regard to *albuminuria* and its relation to the convulsions.

Allbutt's view, that the toxæmia incident to pregnancy will account for the albuminuria from the earlier months onwards, is a very likely one. We may put it in this way. Sometimes the blood intoxication may only lead to increased arterial tension—this is probably the general rule. At other times, if the blood be unduly toxic, either from excessive production of the toxins or owing to their insufficient elimination by the kidney, then we may find the high tension co-existing with more or less albumen in the urine. Should the quantity of urine now markedly decrease, or become suddenly suppressed altogether, then the well-known pre-eclamptic symptoms will appear. Then the toxæmia may be said to cause not only high arterial pressure and albuminuria, but also the convulsions. Hence, the occurrence of albuminuria in the later months of pregnancy indicates that the toxæmia is advancing to a dangerous point, but, so long as free diuresis continues, there will be sufficient elimination of the toxins to guard against serious results.

Scanty albuminous urine with high arterial tension, means that the kidney is soon going to strike work.

Allbutt's explanation is, that the kidneys find it increasingly difficult to eliminate the toxins, and eventually fail in their task. Herman (7) criticises this view, on the ground that it is incompatible with the onset of eclampsia in a few hours in an apparently healthy subject, as it is also with the rapid disappearance of the symptoms when they have developed during pregnancy. Allbutt believes that the toxins are responsible

for the cessation of kidney action by inducing a spasm of the renal arterioles, but does not advance any theory as to how it is brought about. He points, however, to an interesting analogy observed in the toxæmia of lead poisoning, where during the colicky stage there are evidences of general arterial constriction, and the secretion of urine is very much diminished. Many of the symptoms of chronic lead poisoning are remarkably similar to those of the pre-eclamptic state, and some of them are highly suggestive in relation to the question of thyroid inadequacy, as I shall afterwards attempt to show.

Diminution of Urine.—The two most important things about the urine in the pre-eclamptic period are, the small quantity, and the diminished amount of urea contained in it. Albumen, as I have indicated, is merely a symptom of the toxæmia, and need cause no alarm unless the daily urinary secretion is greatly lessened.

Therefore, I regard *a diminution in the quantity of urine* towards the end of pregnancy as a most important danger signal. Albumen and œdema are not always present.

High Arterial Tension.—The only other symptom which I have reason to believe may sometimes afford an earlier indication of danger, is the *radial pulse tracing.* In one case of eclampsia, where I took tracings before marriage and during early pregnancy, the change in pulse form towards the end of the seventh month was so pronounced that I could not but regard it as a premonition. This tracing revealed an unaccountable increase in tension, and six weeks later convulsions commenced. The quantity of urine at this time was perhaps rather less than the average of health, but no albumen appeared till two days before the seizures.

The peculiar solid œdema of the body was present to an unusual extent.

The state of the arterial blood pressure in pregnancy seems to me of great importance, and much more than is generally realised may be learnt from its study, even by means of the sphygmograph. During the later months of pregnancy, the degree of vascular tension is often a gauge of the fitness of the kidney to continue its work of elimination; the higher the tension the less urine secreted, as a rule, and the less capable

the kidney to perform its duties. Thus, excessively high tension, unless accompanied by very free diuresis, should warn one that the kidney is approaching the stage at which all secretion will be abolished. My tracings from eclampsia fully bear out the conclusions arrived at by Ballantyne (8); but the case referred to will be published shortly in full.

To lower the blood pressure in eclampsia is quite a rational procedure, and indeed this is precisely what all our most successful remedies accomplish.

Headache, Diarrhœa, Eye Conditions, etc.—As other symptoms pointing to an unsafe degree of toxæmia, I would mention *headache*, restlessness, epigastric pain, vomiting, and unaccustomed *diarrhœa*. The latter should, perhaps, always attract special attention when occurring towards the end of pregnancy in a person previously constipated. Hadden (9), in a paper on "Cases of Œdema of Obscure Origin," which were probably of a myxœdematous nature, observed diarrhœa in all of them.[1] The dimness of sight and *amaurosis* are generally later symptoms, but I do not think that they are necessarily dependent upon albuminuria.

The eye condition is often the immediate precursor of convulsions, and is probably due to the retention in the blood of the toxins. It is a choroiditis of the same nature, I believe, as that described by Mr Henry Power in his most suggestive Bowman Lecture (10), as occurring sometimes in cases of sudden suppression of the menses, and in amenorrhœa.

I may mention another symptom which I noted in one patient during the pre-eclamptic state, and which did not, at the time, specially impress me. I refer to the frequent occurrence of involuntary twitching of the muscles, chiefly those of the arms and legs. Edmunds (11) states that if the thyroid and parathyroid glands of the dog be completely removed, probably the first symptom observed is a "fibrillar twitching of the muscles." These minor clonic movements precede the onset of severe general convulsions. The appearance of this muscular twitching in dogs is associated with the absence of thyroid

[1] This kind of diarrhœa may be allied to that of menstrual toxæmia, and should be regarded as an attempt to eliminate the toxins. See Barnes, *Brit. Med. Jour.*, vol. i., 1889, p. 456.

secretion. The occurrence of a similar condition in the pre-eclamptic state is suggestive, and may bear the same explanation. This symptom, I have little doubt, would be frequently recognised in these cases if carefully looked for.

I will now endeavour to show how the development of the principal symptoms of eclamptic state may be traced to inadequate thyroid function.

The Evidence that Defective Action of the Thyroid Gland may and does produce these Symptoms culminating in Eclampsia.

In this short paper I can only record a few facts which seem to point in this direction, and say little by way of explanation.

The Action of Iodothyrin.—It will be useful to briefly state some points regarding the action of the thyroid secretion on the normal body. Robert Hutchison (12) has studied the subject very fully in an admirable paper, and has summarised his views in a more recent communication (13). From his conclusions as to the effects of iodothyrin, the active principle of the gland, I select the following:—

1. That under its administration the metabolic processes of the body are greatly increased.

2. That bodily *waste* is thereby increased, and chiefly owing to the *destruction of proteid tissues.*

3. That one of the early and most striking results of thyroid administration is the *increased excretion of urea.*

4. That the thyroid gland probably has the power of intercepting and storing up in its substance the small quantities of *iodine* contained in the food. (Thus, if *iodides* are administered to an animal its thyroid gland will be found to contain a larger proportion of *iodine* than usual.)

5. That in the iodothyrin, *iodine* exists in a certain form of organic combination. While this element is probably essential for the elaboration of a thoroughly active secretion, still it is not to the iodine that the functions of the gland can be ascribed.

6. That iodothyrin must be manufactured *continuously*, and must be supplied in larger quantities in certain states of the

body, *e.g.* pregnancy. Under such circumstances a physiological hypertrophy of the gland should occur.

The Diuretic Effect of Thyroid Juice.—There are some other observations I would like to add to those already stated. Hurry Fenwick (14), in a paper on "The Diuretic Effects of Fresh Thyroid Juice," makes some extremely interesting and suggestive statements:—

1. That the state known as myxœdema may depend upon a perverted renal function.

2. That the thyroid juice possesses a distinct diuretic action in diseases of the kidney, although apparently it is negative in healthy persons.

3. That if ten minims of fresh juice from a sheep's thyroid, with an equal amount of distilled water, be injected hypodermically, the urine increases in quantity during the next day or the day after, and in myxœdema cases increased diuresis may continue for two or three weeks.

Many observers have noted the diuretic effects of thyroidin, and the diminished secretion of urine in myxœdema and cretinism is well known.

The Antagonistic Action of Thyroid to Supra-renal Extract.

George Oliver and Schäfer (15) have shown that the internal secretion of the thyroid gland tends to lower the blood pressure and to dilate the arteries. On the other hand, the internal secretion of the supra-renal glands tends to raise the vascular tension and to greatly contract the arterioles. One may therefore assume that the balance between the two results in a certain arterial tone. In various pathological states this balance may be greatly disturbed. Thus, in cases of cretinism and myxœdema, where the thyroid secretion is much diminished, an abnormally high arterial tension exists, and there are other symptoms which indicate that the vessels are unduly contracted. In cases of Addison's disease, where there is presumably insufficient adrenal secretion, the opposite state of things is found: the arterial pressure is excessively low, and the vessels are well dilated.

George Oliver (16), by means of his arteriometer, has shown

that preparations of the thyroid gland possess a specific tendency to increase the calibre of the radial artery in the human subject. He has also shown that the supra-renal extract, taken by the mouth, produces a general diminution of the radial calibre (17). By the use of the sphygmograph and the Hill-Barnard sphygmometer, in myxœdema and in Addison's disease, I have been able to confirm these statements. In cases of paroxysmal dyspnœa associated with evident arterial spasm, I have found that the arteriometer will indicate a diminished radial calibre during the attack. By intravenous injection, supra-renal extract would seem to act directly on the muscular tissue of the arterioles, and not indirectly through the vaso-motor centre. No agent known produces such an extraordinary rise in blood pressure, and causes such intense constriction of the small arteries. Only direct stimulation of the vaso-motor centre can produce a like result. It is also most interesting that when this arterial constriction is fully developed, during the activity of the extract, even the strongest stimulation of the depressor nerve is powerless to relax the spasm. It is important, too, to note that a truly homœopathic dose of the active principle of the gland—$\frac{1}{800}$ of a grain to an adult man—will produce distinct results on the arteries.

In normal conditions the supra-renal influence which tends to diminish the radial calibre seems to be counteracted by the thyroid influence, which tends entirely in the opposite direction. One may therefore suppose that, should the thyroid secretion become markedly diminished or arrested altogether, the supra-renal influence on the arterioles, including those of the kidney, will be very profound. In this manner an intense spasm of the renal arterioles would be produced, which would result in a cessation of the secretion of urine. Lantos believes the eclamptic condition to follow upon reflex irritation of the vaso-motor centre—presumably by the toxins. This sets up such an extreme degree of vaso-constriction that the blood supply to the kidney is virtually shut off, and anuria results. The late Angus Macdonald (18) held the same view. This arrest of urine is really the "fuse" which leads up to the explosion. It seems to me most probable that it may be induced by an intense spasm of the renal arterioles, and that a stoppage in

the supply of iodothyrin is largely responsible for this result. I do not think it is brought about through the vaso-motor centre—for the time being the supra-renal influence is unopposed.

In the toxæmia of lead poisoning this extensive constriction of the arteries is also produced, and the blood pressure is very high. A great diminution in the quantity of urine results, which may nearly approach entire suppression, and the daily excretion of urea is lessened. Lead undoubtedly disturbs the metabolism profoundly. But a most suggestive point mentioned by T. Oliver is, that in the worst cases, atrophy of the thyroid gland has occurred (19). It is probable, then, that its function has been impaired to some extent, and this would be indicated from the nature of many of the symptoms. Are such profound changes due to lead itself, or are the symptoms dependent on certain toxic materials produced by the presence of the metal in the tissues of the body, which lead to an impairment of thyroid function? In this relation we may mention endemic goitre and cretinism, because there is certainly some connection between these conditions and the presence of a toxic agent in the drinking water. In both, the thyroid gland is affected, and symptoms not unlike those already mentioned result. In cretinism other features are added.

The Influence of the Thyroid Gland over Urea Production.

But I do not think that the spasm of the renal arterioles is the *sole* factor in the causation of the eclamptic state. The quantity of urine secreted may be connected in some way with the amount of urea sent to the kidney. The thyroid gland, by its special action on nitrogenous tissues, and on proteid foods generally, must, indirectly, determine the amount of urea production in the body. Urea is the most powerful diuretic substance with which we are acquainted. In all cases of thyroid insufficiency, the excretion of urea in the urine is lessened, and the quantity of urine is also diminished.

When thyroid function is inadequate, then, the normal destruction of proteids will not occur, less urea will be prepared, and the secretion of urine will become diminished.

Thus the diminished secretion of urine in eclampsia may not depend entirely upon the spasm of the renal arterioles, but may result also from complex derangements following upon the failure of the thyroid gland to deal with the proteids. Here we may have a hint as to the reason why a large proteid meal towards the end of pregnancy may, under certain circumstances, induce eclamptic symptoms. The supply of iodothyrin in the organism at this time is not large, though it may be sufficient for the ordinary purposes of metabolism. If for some reason, however, the thyroid gland has not undergone adequate hypertrophy to meet the wants of the pregnant woman, and is suddenly called upon to deal with an excessive amount of nitrogenous food, then all its reserve secretion may be used up in the attempt to do so.

The Effect of Thyroid Inadequacy on the Liver.

Here, again, is to be found the possible explanation of the manner in which the liver participates in eclampsia. That it in many cases "strikes work" as well as the kidneys, is almost certain, and in three cases of eclampsia I have seen marked jaundice. May not the liver suffer as a direct result of the thyroid inadequacy? Proteids, which should have been modified by the action of iodothyrin, come to it unchanged. It is not astonishing that the organ "gives in" when a new function is suddenly demanded in addition to the innumerable ones it already performs.

I would like to mention one other point which suggests that the thyroid gland may preside in some subtle manner over the functions of the renal protoplasm. I refer to the experiments of Bradford (20), who found that the removal of large quantities of the kidney substance in animals was followed by great emaciation, due to the rapid wasting of proteid tissues, chiefly the muscles, and also by the excretion of large quantities of urea. The quantity of urine was generally increased. This is simply a more extreme degree of what happens when thyroid extract is administered in large doses as a so-called anti-fat. May not the extensive removal of kidney substance partially abolish one of the functions of the iodothyrin, with the result that the surplus is utilised in exert-

ing its full power on the proteid constituents of the body? Hence, also, the abnormal production of urea.

I have said enough to indicate that iodothyrin is a remarkable substance, which is probably utilised in the metabolism of all the tissues of the body. It is not unlikely, therefore, that it should play a prominent part in the disturbed metabolic processes which belong to pregnancy.

Inadequate supply of iodothyrin towards the end of pregnancy may result in the anuria, which, by allowing the absorption of the toxins, leads up to the eclamptic symptoms. The cessation of kidney action is probably due partly to an intense constriction of the renal arterioles, and partly to impaired function of the thyroid gland with regard to its influence over urea formation, as already indicated. When there is insufficient iodothyrin to deal with the proteids introduced into the body, the liver is overburdened, and matters are further complicated. Iodothyrin may also exert a specific influence over the renal protoplasm, and may thus control the function of diuresis, but there is no definite proof of such an action.

The Treatment of Eclampsia and the Pre-eclamptic State by Thyroid Extract.

We now come to the important question of treatment.

Milne Murray has said "that for every strictly obstetrical complication, with the exception of eclampsia, we profess a remedy." With this statement we agree entirely, for our treatment is directed along well-established lines, and we know exactly what we wish to do. But in eclampsia we are groping in the dark. There are no principles of treatment we can adopt in all cases which we may reasonably expect will be followed by a successful result. If, as I have endeavoured to show, even some of these cases of eclampsia are associated with an inadequate supply of thyroid secretion, then our efforts at treatment will rest upon a sounder basis. The patient may be treated in the pre-albuminuric stage, in the pre-eclamptic stage, and even after the convulsions have commenced, with a fair prospect of success. If patients could be induced to seek advice during their pregnancy, the slighter premonitory symptoms might be recognised, and we would be forewarned

of danger. It is very probable that the earliest indication comes from the pulse. If, towards the end of gestation, it becomes abnormally slow and of high tension, there is good reason to examine for other symptoms. Almost invariably, I believe, will we elicit a history of diminished quantity of urine for several weeks before the appearance of the more definite pre-eclamptic symptoms. Small pathological enlargements of the thyroid gland should, I think, arouse suspicion. When present, some degree of inadequate function may be inferred. I have personal knowledge of two such cases. In one, albuminuria developed early in pregnancy, and was so persistent that premature labour was induced; in the other, there was eclampsia at full term.

What is the treatment, then, in the early stages of the disease, where the quantity of urine seems to be less than the average of health, where the pulse tension is perhaps unduly high, but before albuminuria has appeared?

The thyroid extract may be given in 5-grain doses, night and morning, and after a few days the same dose may be administered thrice daily. Proteid foods should be entirely forbidden at first, but, with increasing secretion of urine, and improvement in other symptoms, they may be cautiously resumed.

The interesting question arises as to whether it is possible to indirectly augment or re-establish thyroid function by supplying iodine to the patient in the form of iodide of potash. As has already been indicated, the iodine will be picked out of the blood by the gland, and may be elaborated into the active principle iodothyrin. In this connection it is noteworthy to find that iodide of potash, in small doses, has been regarded as a specific for puerperal albuminuria (21).

It is suggestive, too, that quite recently iodide of potassium infusions, instead of ordinary saline infusions, have been advocated in the treatment of eclampsia. Kocher (22) states that iodide of potash will cure some cases of goitre, but that there is a risk of iodine poisoning during the treatment.

But in giving thyroidin itself we are supplying iodine to the thyroid gland. Thus in myxœdema, where there is impaired function of the gland, if we give thyroidin by the mouth, iodine

appears in the urine. In the breaking up of this substance iodine is liberated, and there is no normally acting thyroid gland to absorb it, so it is got rid of. Therefore, in giving thyroidin in eclampsia we probably obtain all the good effects of giving iodide of potash, and also other effects not produced by the latter drug.

When all the symptoms of eclampsia have appeared, and a fit seems imminent, or if convulsions have already occurred, then I do not think we can trust altogether to the use of thyroidin by the mouth. The action will not be rapid enough.

In such cases I would suggest the hypodermic injection of 10 or 15 minims of the liquor thyroidei, and this might be repeated every hour or two if not followed by signs of improvement. Or, better still, if we can obtain the fresh juice from a sheep's thyroid, and inject 10 minims of this with an equal quantity of distilled water. Experience will show whether these are adequate doses under such circumstances; for I can imagine that much larger quantities might be used with safety, and perhaps with lasting benefit.

For the immediate treatment of the convulsion *morphia* is the remedy of all others, and should always be used, if only for the reason that it will promptly inhibit the various processes of metabolism. By doing so there is the opportunity given to the thyroid gland to recover itself. Therefore the dose should be sufficiently large—not less than half a grain for the first injection. Eclamptic patients resist the dangerous effects of the drug in a remarkable way. Clark of Oswego (23) has used as much as a grain and a half hypodermically, and Grace (24) reports cases where a grain was employed with uniformly good results. This extraordinary tolerance is difficult to explain, but we must remember that the medullary centres are undergoing abnormal stimulation from the toxic condition of the blood, and the arteries are firmly constricted. In other cases of general arterial spasm morphia is equally safe. Thus, in acute peritonitic and other painful conditions, opium may be used with a very free hand.

Stephen Mackenzie (25) has used morphine hypodermically for the high tension and arterial spasm of chronic uræmia which is set up by the abnormal contents of the vessels. Its great

value, he says, is that "it relieves the blood-vessels from spasm." This is certainly what happens when we give a full hypodermic injection of morphia in eclampsia, and this is probably one of its most valuable effects in these cases. Even in cases of angina pectoris, when all the well-known vaso-dilators have been used and have spent their power, we resort to morphia and obtain the desired result.

Morphine, then, dilates the arteries and reduces blood pressure perhaps more precisely and with more lasting effect than any other remedy. Haig (26) makes some interesting suggestions as to the mode of action of morphia in puerperal convulsions. There is an "uric acid storm" at the end of pregnancy, he says, and morphia is beneficial by its effects on uric acid. I cannot now discuss his views, but they are well worth consideration in relation to defective thyroid function.

I may say, however, that I fully appreciate his rationale for the administration of salicylate of soda after the use of morphia, that is, during the time when uric acid is again being excreted. I would advocate the use of this drug, in large doses, in eclampsia after the completion of labour. Post-partum eclamptic seizures do not always seem to be of quite the same character as those which occur before and during labour. The use of morphia leads to a locking-up of uric acid in the tissues, and this is followed by an excessive output into the blood current. May we not connect this circumstance with the occurrence of post-partum convulsions? In cases of eclampsia treated by morphia they are perhaps specially liable to develop.

The eclamptic seizures seemed to be controlled to some extent by all remedies which tend to dilate the arteries. Drugs acting in an opposite way would seem to do harm, and Malcolm Black (27) reports a case where eclampsia was possibly induced by a tablespoonful dose of ergot.

Thyroidin, from its specific action in enlarging the radial calibre, may act by relieving spasm in the first instance. But we must recognise that in giving this drug we are also fulfilling other important indications, some of which we are not yet in a position to properly appreciate.

The treatment of eclampsia and of the pre-eclamptic state

by means of saline infusions is highly extolled by Jardine and others. The beneficial results following their use have been explained in various ways. I am sure that one of the early effects of giving such an infusion to an eclamptic patient is to remove the arterial spasm, and thus fulfil the first indication of rational treatment. Then, in the natural course of events, diuresis will follow. Any increase in the blood pressure caused by the infusion is of an exceedingly transient nature, for the calibre of the radial artery very soon indicates an enlargement, and there are evident signs of lower tension.

On this theory of eclampsia, then, it is possible, by the combined use of thyroidin and morphine—

1. To fully and permanently relax arterial spasm.

2. To temporarily arrest general metabolism, and in this way, tide the thyroid gland over a period during which it may recover its functions.

3. To supply artificial iodothyrin, to counteract certain symptoms due to its deficiency in the blood and tissues.

4. To supply *iodine* for the elaboration of iodothyrin by the thyroid gland itself, and thus hasten its return to normal activity.

I have now recorded some facts in support of my contention that thyroid inadequacy plays an important part in the causation of some cases of eclampsia. I am fully conscious of having only touched the fringes of this most interesting subject. I have a firm conviction, however, that the thyroid gland does participate in a most important manner, not only in eclampsia but also in the production of many of the symptoms associated with pregnancy and menstruation.

Thus a woman has such symptoms as severe frontal headache, nausea, vomiting, and diarrhœa at each of her menstrual periods. May not these symptoms afford a possible indication that during pregnancy her thyroid gland will be taxed to its utmost, and that she may become eclamptic? A physiological enlargement of the gland should occur during each menstruation. If it does not do so, may we not have the counterpart of a pre-eclamptic period? Mere mention may be made of the vomiting of pregnancy and its relation sometimes to defective

thyroid function. There is much to be said in favour of such a view.

Taking it for granted that there is an intimate relationship between eclampsia and the thyroid gland, it is by no means clear what it is. I am not aware that anything has been written on the subject, so I have brought forward, in this disconnected way, some evidence which I hope may be suggestive to others, and which may assist in the elucidation of this obscure connection.

Note.—I had recently another opportunity of noting the effects of thyroid treatment in a case of eclampsia under the care of Dr Ballantyne at the Edinburgh Maternity Hospital. The case, a severe one, had been treated by morphia, and post-partum seizures were occurring every few hours. In this patient the peculiar type of œdema already described was a most marked feature. She had no fits for 24 hours, but was still in a typically eclamptic state, when 5 grains of thyroid extract were given thrice daily. No more fits occurred, and the symptoms improved. The way in which the œdema subsided was extraordinary. Its extent was only properly realised when the remarkable alteration in the appearance of the patient was observed.

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The President said, they would agree that no subject in the whole range of obstetrics could interest the Society so much as the subject of Dr Nicholson's paper. He confessed that his reasoning in support of his theory as to the influence of thyroid in eclampsia was highly suggestive. But it was almost too subtle to follow on some points, and he feared it was open to criticism. At the same time, they were indebted to him for laying before them, though on comparatively slight evidence, a chain of reasoning that would bear a certain strain. He thought Dr Nicholson, perhaps by a plausible series of physiological suggestions, had laid more stress on incidental observations than he was justified in doing. However, he had very properly brought forward the subject, and they were indebted to him for the way in which he had laid it before them. He would be glad to hear remarks.

Dr Underhill said he entirely agreed as to the value of the paper; he thought it was one of the most important subjects they could deal with in obstetrics. Hitherto they had been looking about for a theory, and most of these theories concerned themselves with the immediate pathological changes they found post-mortem. Here they had a theory that went a great deal further back, and dealt with causes, and set them thinking in a new direction. When

further observation was made, and the theory was further developed, it might lead to important changes in their views in relation to practice. But they all welcomed any theory which gave a reasonable prospect of suggesting some method of dealing with this most disastrous complication of labour.

At the same time there were some points about it that the theory did not seem to explain, and which would require further elucidation before they accepted it. One was that the disease itself was so rare, only one woman in five hundred was afflicted in this way. Another and more important reason was, that it did not explain the enormous preponderance of primiparæ. Now, he had occasion recently to look over the records of the Maternity Hospital for the last five years, in regard to eclampsia, and found notes of 28 cases. Of these 25 were primiparæ, and the others multiparæ. Fifteen of the 28 cases recovered, and 13 died. The three multiparæ all recovered; so that they had 100 per cent. recovering in multiparæ, whereas of the 25 primiparæ cases 13 died. Incidentally, as regarded that question, a good deal of the fatality in hospital was due to the fact that they did not get the patient soon enough. A woman took a fit, and was seen to by her friends, then after some hours the doctor was sent for, and there were no opportunities or apparatus at hand to treat her properly. Then by the time they reached the maternity she had had many fits, was in a comatose condition, and had little chance of recovery, whatever treatment might be employed. He would like to know if Dr Nicholson could give them an idea why it affected primiparæ so much more than multiparæ. His idea was that it was due to pressure on the kidneys, and that this was one of the factors, and a strong factor, in the production of eclampsia. They had all seen œdema both in women who had had albuminuria and women who had not had albuminuria; but he did not agree with Dr Nicholson on this matter, for the œdema rapidly disappeared after labour. The patient might be big and bloated before the child was born, and altered almost beyond recognition, but as soon as the child was born the kidneys began to act, and there was an extraordinary amount of urine; from 60

to 80 or even 120 ounces on the second or third day. Now the rapid disappearance of œdema after labour was not consistent with the disease being analogous to myxœdema. These were the two principal points that struck him. Hitherto morphia and chloral had been used as sedatives in eclampsia, but Dr Nicholson was advancing the more reasonable explanation that the use of morphia dilated the arteries. In this connection he referred him to a paper on "Enlargement of Thyroid during Pregnancy," written twenty-seven years ago by Lawson Tait. Tait had seen 20 cases of enlarged thyroid during pregnancy, in Birmingham. He gave short notes of a dozen, and pointed out that the thyroid frequently enlarged during pregnancy, sometimes to a very considerable size, and gradually went down afterwards. Then it enlarged again and went back again, and so on in a number of pregnancies, always leaving the thyroid a little larger after each pregnancy. Another curious point was, that all the women who had these enlarged thyroids during pregnancy had severe hæmorrhage during labour, and were liable to have considerable losses during the non-pregnant period. Tait did not attempt to explain these things. Dr Nicholson had made an exceedingly valuable contribution to the subject, and he hoped that, as he advanced, his theories would turn out to be facts, and that they would reap the benefit of his observations.

Dr Berry Hart considered that Dr Nicholson's paper was ingenious and interesting. Cases of pregnant women with myxœdema were rare, but a few had been recorded. According to Dr Nicholson's views these women should have had serious eclampsia, but no result like this had been found. In dogs, where the thyroid had been removed, subsequent pregnancy had been uncomplicated on the part of the mother so far as eclampsia was concerned. They knew so little about the real nature of eclampsia that it lent itself seductively to theory, and one had therefore to be very cautious in speculative investigation.

Dr Russell said that, as a physician, he was of course much interested in the thyroid and its functions. He had been much interested in the view that Dr Nicholson had advanced, because

he supposed they must take it on general lines that eclampsia was the result of some poison—and these poisons were of course the result of inefficient metabolism or imperfect excretion. Formerly the general idea was that eclampsia was largely the result of definite kidney lesion, but more recently it had been shown that there had been cases in which kidney lesion had not been demonstrated. It was in these cases, he should imagine, that Dr Nicholson's view might really be found to be applicable; that was, that they had, or might have at all events, a certain number of cases which went on to eclampsia where the condition was really determined by the failure of the thyroid secretion. Not very long ago one of his colleagues in town committed himself to a statement that a woman either had myxœdema or she had not. That was a statement which he was not in a position to question at the time, but since then he had seen cases which were clearly cases of thyroid inadequacy. These cases, he thought, might throw a certain amount of light on Dr Nicholson's suggestion; because he thought they must assume that the thyroid could be inadequate—that it might be even temporarily inadequate—as in certain cases he had seen and treated for a certain length of time with thyroid extract, and which had recovered, and had not relapsed—much to his surprise, no doubt, but still they had not relapsed. Not long ago he had a case which to his mind was unmistakably myxœdema, and which rapidly recovered under thyroid. The woman died, but curiously enough there was not the amount of destruction of the thyroid gland one expected to find, and generally found, in a marked case of myxœdema. One would almost naturally expect to find eclampsia most common in primipara, because of course the previous conditions were very much upset in a first pregnancy. No doubt after a time nature adapted herself to the exigencies of a physiological condition of this kind. With reference to the effect of thyroid on blood pressure and arterial spasm, these were effects fairly well-known, but Dr Nicholson had done a great deal to bring them more forcibly and more markedly under their notice. This relief of arterial spasm by thyroid was one he thought which would probably open up some very important channels of observation even in connection with other diseases. The

whole question of arterial spasm, as some of them knew, was one which had been interesting him largely, and on that account he was particularly interested in the communication of Dr Nicholson.

Dr Haultain said there were a large number of debatable points raised by the paper, but it seemed to him the crux of Dr Nicholson's communication rested on what he had told them regarding the question of increased arterial tension. He thought it was an undoubted fact—at least they had known so for many years—that the probable exciting cause of eclampsia was the increase of arterial tension, induced probably by some toxine in the blood. It seemed to him, therefore, that from this point of view they found the value of the thyroid extract. It would appear to him that it would act probably in the same way as the nitrites and other drugs, which exerted a certain dilating effect on the blood-vessels, and by that means counteract the tendency to the spasm, which was supposed to be the actual cause of convulsions.

Dr Ritchie said he had one remark to make on the question of treatment. It was pretty clearly acknowledged that any drug that raised the blood pressure in eclampsia was bad. They wished to give something that lowered it. Opium lowered it, but it diminished the urine secretion. Thyroid increased the urine gradually, even in cases not eclamptic nor myxœdemic. They were therefore indebted to Dr Nicholson for bringing before them in this pointed way the use of thyroid in this particular trouble; because it lowered the blood pressure and gradually increased the urinary secretion, both of which were very important effects in the treatment of eclampsia.

Dr J. W. Ballantyne said the case which had been under his care, and which had been referred to by Dr Nicholson, was a typical one of eclampsia, and came into the Maternity Hospital in a serious condition. She did fairly well under morphia, and, as he had come to expect in these cases, she passed a fair amount of urine during the twenty-four hours following the use of morphia. The fits stopped for a time, and he thought she was going to do well. The second evening after she came in the fits returned, and they gave morphia again, and again there was a considerable flow of urine. He was not sure if there was

a third return, but about that time thyroid extract was also administered. No fits followed the administration of the thyroid, but he did not personally place a great deal of weight upon that. But he was struck with the rapidity with which the œdema then began to disappear. It showed no signs of disappearing before that, but after the administration of thyroid it began to disappear very rapidly. Ultimately the patient went out pretty nearly quite well again. Lange, in his article on the thyroid in pregnancy, did not draw many deductions from his observations, certainly not so many as did Dr Nicholson. He was inclined to think that it was very striking what Lange had found—viz., that in 25 cases of albuminuria there was diminution in the size of the thyroid gland in all but one or two cases; but it was not clear what Lange meant when he spoke of diminution in the size of the thyroid. From his own observations lately he believed that it was exceedingly difficult to say whether the thyroid was enlarged or not. They were almost entirely dependent on the isthmus of the thyroid for their estimation of size, unless the gland was much enlarged or greatly diminished. He was not sure that Lange had not that fact in his mind when he hesitated to draw many conclusions from his observations. Then there was a third point he would like to say something about, although perhaps not exactly on the lines of Dr Nicholson's paper. It was this. At the Edinburgh Maternity Hospital, apparently from Dr Underhill's statistics and his own observations, they had a considerable number of cases of eclampsia, a number which he thought out of proportion to what they should have in such a hospital. The statistics of the Rotunda showed there were 3700 cases of labour inside and outside in one year, and there were 6 eclampsias of which only 1 died. Now, in five years Dr Underhill said they had 28 cases at the Edinburgh Maternity, out of something like 4500 cases, which was an enormous disproportion. Was there any difference in the mode of living of people in Dublin and Edinburgh? It did not appear to him there was any sufficient cause for the great disproportion—28 cases of eclampsia out of 4500 cases, and 6 cases out of 3700. Whatever the reason was, it was important for those who had to do with the Maternity to consider the fact. There was one

other fact he would deal with, and it was this. For some time there had been an attempt to build up the theory that the toxic element producing eclampsia came from the fœtus. He had followed the literature on the subject, and he found that theory was gradually breaking down—it was coming to be believed that the fœtus sent very little toxin to the mother. Another point that had recently emerged was with regard to the thyroid of the fœtus supplementing the mother's thyroid action. They must probably modify their views as to that possibility, because the normal fœtus had no iodine in its composition, and so there could be no question of the transmission from the fœtus of iodothyrin at anyrate. He regarded as the most valuable part of Dr Nicholson's paper that in which he brought together much information regarding the relations of the thyroid gland to pregnancy. That part was he thought more valuable than the suggestion as to treatment; but it had to be remembered that without the suggestion as to treatment they could not in all probability have had such a good discussion. It was the therapeutic suggestion which had stimulated discussion.

Dr Macvie said their medical forefathers had a different way of looking on diseases and their causes; they did not look so far, or so very deep; they were less analytic, probably less subtle, but they did not lose sight of outstanding permanent conditions. While he was prepared to follow Dr Nicholson and to take what he said for fact, he did not see that they were doing more than going tethered at one end round a certain circle. First they came to the kidney and its albuminuria, then to the liver and its lesions, then to some other organ and its inadequacy; probably some other organ still would be found to be the exciting cause of eclampsia at some future time. This seemed like going round a ring-fence. There was no doubt that during pregnancy there was greater growth and greater waste. If metabolism and excretion were insufficient, changes would be produced in the blood which would affect not one but every organ, and he doubted if ever evidence would be produced to prove that one organ alone was the exciting cause of every case of eclampsia; because, when every organ was affected by changes in the blood all would contribute, and probably in

varying amount. Looking at the physiological changes going on, even the intra-uterine and intra-abdominal pressure spoken of by Dr Underhill had a considerable deal to do with the production of eclampsia. If they considered the fact that first pregnancies gave a great majority of eclampsic cases, they would hesitate to regard the thyroid as the exciting cause; for if that were so, they would expect that in multipara, when the thyroid had suffered from tear and wear, the greater proportion of eclampsic cases would be found. There was an idea that the defective metabolism and inadequate excretion was best treated by lowering blood pressure, and morphia was much vaunted by some practitioners. But let a case be conceived where every symptom but the actual fit was present: albuminuria, œdema, gastric disturbance, and nervous phenomena. Now, who would think of giving morphia in such a case. They must distinguish between the treatment applicable to the conditions existing before and after the convulsion! So far as metabolism and excretion were concerned, these conditions were not essentially different except in degree, and morphia was administered to lessen the responsiveness of the nerve centre rather to correct defective metabolism and excretion, or lower arterial tension. At all stages, however defective, metabolism and excretion had to be dealt with, and whatever drug promoted functional activity and aided this object would have a scientific value. Comparisons between the number of cases in Edinburgh and Dublin were misleading. The existing conditions were probably different. In some parts of the country rheumatism was more prevalent, and in others there were fewer cases of strumous affections of the joints. During twenty-five years he had not heard of an excised knee, elbow, or wrist in Berwickshire. In comparing areas, they had to take topographical influences, age incidence, and many other circumstances into consideration before drawing conclusions from the percentage of eclamptic cases to the number of births.

Dr Nicholson, in reply, said he had not mentioned that under the heading of thyroid gland the parathyroids were included. The thyroid gland was by no means the most important part of the thyroid system, though it was probably the part mainly affected in myxœdema. The parathyroids were certainly of equal importance, and it was possible that they

were specially concerned in the production of many of the symptoms of eclampsia. He would not advocate the use of morphia in eclampsia on any account till convulsions were imminent, or until they had already occurred. In the comatose type of uræmia the use of morphia, he believed, was invariably fatal. In those cases, however, where there were muscular twitchings and convulsive seizures, morphia was of undoubted value. Mackenzie and others had published cases which seemed to show that. Nitrites had been used with some benefit, but they only relaxed the arterial spasm temporarily. The action of morphia was much more permanent. Possibly thyroidin would prove still more useful as a means of relieving this condition of extreme vaso-constriction.

VIII. EXTRACTS FROM THE TALMUD AND FROM CELSUS ILLUSTRATIVE OF THE STATE OF MEDICAL SCIENCE AT THE BEGINNING OF THE CHRISTIAN ERA (GYNÆCOLOGICAL).

By H. M. Church, B.Sc., M.D., F.R.C.P.E.

When we read, in St Mark's Gospel, of the case of the woman whose strength had been undermined by a uterine hæmorrhage going on for twelve years, more or less continuously—who had suffered many things at the hands of many physicians; who had spent all that she had, and was nothing bettered but rather grew worse—our curiosity is aroused as to what kind of treatment the poor woman did undergo which had been both so expensive and so ineffectual. Nor does St Luke, the physician evangelist, who lingers over the pathological side of his Gospel with an intense interest, throw any light on the details of this particular case. He, too, only relates the case and its miraculous and instantaneous cure by touch of the Saviour's garment. It is interesting to note how St Luke does not add the worse, "but rather grew worse," possessed as he was with the finest spirit of consideration for his fellow-practitioners, we must suppose. The woman whose sad case they record had seen many physicians. It is not likely that she had seen Celsus, whose headquarters were in Rome, though

wealthy patients at that time appear to have travelled long distances to see a physician of eminence. The inadvisable habit of rapidly changing doctors is said still to be common in the East, and of many an Oriental patient the sepulchral inscription mentioned by Grotius may be applicable, "Turba medicorum me perdidit." There seems to be little perseverance in the same treatment or medicine, and if relief does not speedily come, superstitious practices are resorted to in order to aid the medicine, and are gradually increased till at last drugs are altogether given up. In the Gemara, or medical commentary of the Babylonish Talmud, many cases are given. So gruesome and grotesque are they, that we may infer that this woman of the Scriptural story may have been the victim of much harsh treatment. Dr Lightfoot shows (Hor. Heb.) the torture women were put to for cure of uterine hæmorrhage. The following may be quoted, which illustrates first the use of drugs, then of drugs and superstitions, and last of all of superstitions entirely:—"Take of Persian onions thrice three measures, boil them in wine, and give it to her to drink, and say, 'Arise from thy flux.' But if this does not prevail, set her in a place where two ways meet, and let her hold a cup of wine in her hand, and let somebody come behind her and affright her, and say, 'Arise from thy flux.' But if this does not benefit, let them dig seven ditches, in which let them burn of such vines as are not circumcised (that is, that are not yet four years old), and let her take in her hand a cup of wine; and let them lead her away from this ditch, and make her sit down over that, and let them remove her from that, and make her sit down over another; and in every removal you must say to her, 'Arise from thy flux,' and so on." Other cases need not be quoted. In all of them, psychological factors, such as mental or bodily shock, fear, faith, hope, appear to have been employed with more efficiency as hæmostatics than any drug. It may be gathered from the Talmud that *treatment* in the hands of the Jewish doctors was poor, and far behind their speculations and experiments. With Celsus, the Gentile physician, the converse was the case. But the questions taken up by the Jews are of interest, both to physiologists and pathologists of the present day.

Medico-legal and medico-ethical questions abound. To the Obstetrical Society the traditions and physiological ideas in the Gemara are not without special interest. Many of them are sexual, and have much to do with reproduction. To Rabbinowicz, who lately published his book, "La Medecin du Talmud," we owe most of our knowledge of the theories which exercised the minds of doctors, Jewish and Gentile, nearly two thousand years ago. He has fished up, in a perfect state of preservation, out of old Jewish literary wreckage, many an antique medical curiosity. Bergel also has brought to light much that is interesting. Before referring to Celsus, in whose name centres and is handed down to us the best medical traditions of the time, and from whose writings a few quotations are taken later on, I shall, in the first place, give one or two extracts, suitable for this Society, from writers on the Talmud. Some of the subjects placed on scientific lines might be provocative of a good deal of discussion by us.

To begin with the embryo. Its life from the time of conception, was believed by the rabbis to be under the special care of an angel, who, during its nine months' growth *in utero*, commenced its education, giving it its first tendencies, and initiating it unconsciously in all learning, but especially in the knowledge of the Rabbinical laws.[1] In the work of this angel we see a figurative expression of their belief in heredity and inherited tendencies, the family characteristics or inborn traits of Darwin as we would now express it. At the time of birth the angel smites it on the mouth,[2] as if to sever it from all the *prenatal* impressions and influences that acted upon it as the susceptible fœtus *in utero*. The angel cuts, as it were, a metaphysical umbilical cord, and starts the infant on his individual life, endowed with his inherited constitutional energies in a new environment.

Then, as regards the probable sex of the embryo, the Talmud goes on to show how this depends, as it unscientifically expresses it, "upon whether at coitus the male or the female seed gets first into the womb. If the former, then female children result; if the latter, male children."[3] The difference of sex ought to

[1] Bergel, Nidah, 30, 2. [2] Dr James Finlayson's Talmud, p. 232.
[3] Gemara, Berach, 60; Nidah, 28.

make itself known, however, even during pregnancy, by certain signs. "A woman who is pregnant with a male child ought to have a better complexion, the quickening should occur earlier, and parturition also ought to be easier and less painful. The last-mentioned circumstance is specially insisted upon by the Talmudists."[1] A sexual theory, bearing on this subject, is given by Rabbinowicz in the following words:—"Si la femme donne sa semence (le sang) avant l'homme, le fœtus sera un garçon; si c'est le mari qui donne d'abord sa semence (le sperm), le fœtus sera une fille. On peut donc, si on veut avoir des garçons, l'homme peut, pour cet effet, retarder son emission de sperm pour laisser la femme donner sa semence avant lui. Rabba dit qu'on obtient des garçons en repentant le coït; car, la femme excitée par le premier coït, émettra son sperm avant l'homme pendant le second."[2]

The subject of cohabitation during pregnancy was much discussed by the doctors in the Gemara. On this matter Rabbinowicz sums up their opinion in these words:—"Les premiers trois mois de la grossesse (l'enfant se trouvant dans la region inferieure) la cohabitation est mauvaise pour la mère et pour l'enfant; les autres trois mois, la cohabitation est mauvaise pour la mère et bonne pour l'enfant; les derniers trois mois elle est bonne pour la mère et pour l'enfant, car elle fortifie le fœtus."[3]

Bergel tells us that the Talmudists refer to monsters like insects, fish, cattle, birds, and indeed like almost any creature.[4] They did not know, to use a modern expression, that "human organo-genesis is a transitory comparative anatomy."[5] They might have found some explanation of these phenomena of arrested and altered development in this fact of science. Nor were they aware of the remarkable frequency, as has recently been pointed out by Gheorghin, as the probably cause of malformations, of acute or chronic infectious disease being present in one or other of the parents at the time of conception.[6] As

[1] Finlayson's Translation of Bergel, Med. der Talmud, p. 73.
[2] Page 85, Nidah, fol. 31.
[3] Page 84, Nidah, fol. 31.
[4] Med. der Talmudisten, Nidah, 21, 1, etc.
[5] Marshall's Vertebrate Embryology, p. 26.
[6] Professor Adami, M'Gill University, May 1901.

regards hermaphrodites, the Talmudists could not decide whether they belonged to the male or female sex. Unfortunately, there was no Ballantyne in those days to give morphological expositions on this difficult subject. Had there been, some unfortunate creatures born with such deformities might not have been excluded from civil and religious rights, as was then the penalty for having been born deformed.

As to the mother. On the ancient law regarding the purification of the mother after childbirth, we have a full account given in Leviticus (Lev. xii. 2, 4, 5) as follows:—"If a woman have conceived seed, and borne a *man child;* then she shall be unclean *seven* days; according to the days of the separation for her infirmity shall she be unclean. And she shall then continue in the blood of her purifying *three and thirty* days. But if she bear a *maid child*, then she shall be unclean two weeks, as in her separation; and she shall continue in the blood of purifying *three score and six* days." In other words, the period of uncleanness and purification was double in the case of a female birth from what it was in the case of a male.

Much discussion has arisen from this curious point in the Levitical law. Certainly it does not regulate us in our midwifery practice nowadays. Indeed, do we not rather look for greater difficulty in labour with a male child, and more anxiety in the puerperium following? But this probably has arisen from altered conditions of life. In the early history of the human race, out-of-door and nomadic habits of life, as in the case of the Hebrew people, must have greatly invigorated the female constitution for child-bearing. Times have changed for Jew and Gentile alike. The world was not so crowded, nor life so strained, then as it is now. Hence the sad departure from the physiological simplicity of reproduction of primeval times.

To account for the greater difficulty in labour with a female child, a writer in the Talmud states[1] that the female fœtus turns round so as to present (at birth) with the face *anteriorly*, while the male presents with the face *posteriorly*. We can hardly doubt the accuracy of this statement, being a matter simply of observation and not of theory. Granting

[1] Finlayson's Talmud, p. 237.

that this observation is correct, we have some explanation of the greater difficulty in bringing forth a female child, and the necessity for prolonged care afterwards, according to the Levitical law. It is to be observed, however, that the writer only states the position of the head at birth, and says nothing about the mechanism of labour. One would infer from the statement, that all female children would lie with the occiput posteriorly. Nowadays, the largest proportion of all births of female as well as male children have the occiput to the left, and of these the largest number are R.O.A. In comparing the statements of the ancient world with the records of our own Maternity Hospital, I find that in the latter, occipito-posterior births are now only one quarter more frequent in females than in males. This large number of males coming into the world with occipito-posterior presentation at birth I believe to be abnormal, and an evidence of a departure, in these later ages, from an original law in parturition.

In regard to the *sex* of the child determining a longer or shorter period of purification for the mother after child-birth, the following doctrine is laid down by the Talmud, a doctrine which it is difficult for us quite to understand:—"Avant quarante jours aucun fœtus n'est formé; au commencement du quarante et unième jour le fœtus, mâle ou female, est déjà formé; d'après rabbi Ismael un garçon est formé le quarante et unième jour et une fille le quatre-vingt-unième jour."[1] The rabbi, founding on Leviticus xii., thus held that the male is formed on the forty-first day and the female on the eighty-first, which was surely believed as a fact from Hippocratic times. Their theory was that *the slower development of the female fœtus in utero resulted in the slower process of purification in the mother after its birth.* But we may believe that the condition of robust health of the mother, which was probably the explanation of her having a *male* child, the earnest desire of every woman in those days, was also the explanation of her more rapid recovery.

These dates of the forty-first and eighty-first days are difficult to reconcile with our knowledge of the develop-

[1] Rab. Misch. Nid., fol. 30.

ment of the organs of generation, which does not commence until after the rudiments of the principal organs of the body have appeared. The internal organs of generation first make their appearance, and for a brief period no sexual difference is perceptible in them. The external organs, which subsequently begin to be formed, are also identical to the naked eye in appearance in the two sexes as late as the fourteenth week,[1] that is, from the ninety-first to the ninety-eighth day. Had we no microscope, we could not discriminate the sex of the fœtus till about the ninetieth day at soonest. We have, therefore, to believe that the Jewish doctors could determine the sex of the fœtus at an earlier date than we can; in other words, that the sex of the child appeared sooner then than it does now.

Such a keen interest was taken in this question, that history records how the Greek queen, the notorious Cleopatra, made experiments to settle this point.[2] She ordered, it is said, female pregnant slaves to be killed at certain dates after conception. It was found on dissection, said some, that the sex of the male fœtus could be recognised at forty days, but the female only at eighty days. But from the following sentence it would even appear that the sex of the fœtus of either sex could be seen at forty days. "Mais les autres docteurs lui appasè rent un fait d'observation; car, dirent-ils, la reine Cléopâtre ayant condamné à mort et fait exécuter ses esclaves, on les a disséquées et on a trouvé des fœtus des deux sexes qui etaient tous les deux formés au haut de quarante jours." Obviously there was want of scientific accuracy in such barbarous experiments as these, and room for much fallacy and deception. The queen, no doubt, apart from her own curiosity in such matters, may have been induced by the Alexandrian physicians to assist them in settling this vexed and difficult point in development, on which, according to their theory, rested the correctness of the law regarding purification, given nearly fifteen hundred years before. Of course, it is possible in these experiments they may have made their observations adjust themselves to preconceived opinions, but it is equally possible that they were

[1] *Quain's Anatomy.* [2] Rab. Nidah, p. 83.

substantially correct, as in the case of the invariable occipito-posterior presentation of the female child.

To us, not less than to these Jewish doctors, does the sexual organo-genesis of the forty and eighty days present a puzzle. Amongst the early Hebrew people, when reproduction and multiplication of descendants was a matter of paramount importance, there seems to be evidence of an earlier development of the organs concerned in this process. And when we consider what physiological modifications in development may have occurred during the well-nigh three and a half millenniums that have elapsed between the giving of the law and our own time, we may well feel it unscientific to criticise. It becomes scientists at least to speak with diffidence. We know that types of disease change. Even certain types of face seem to predominate in certain centuries. Physiological processes also change. As an instance of the latter, the long period of nursing in ancient times may be quoted—a wonderful change from that physiological process of to-day. The following sentence is from Judas Maccabæus, "O my son, have pity on me that bare thee, and gave thee suck *three* years, and nourished thee and brought thee up unto this age, and endured the troubles of education" (2 Mac. vii. 27). In pathology, too, the conditions known in one generation are not known in another. Dr Jardine, in a recent paper on the Glasgow Maternity Hospitals, says, "It is a very striking fact that we now have so many cases of contracted pelvis to deal with, while in the early days of the Hospital they were so exceedingly rare." And as regards obstetric practice, many a physician nowadays never meets with a case of perfectly *normal* labour. Such instances are brought forward to show what changes may occur, and to guard, as it were, an ancient physiology from the criticism a present-day physiological orthodoxy might offer, remembering that it is possible that there may be change in the relative *evolution* of organs, according to mode of life and circumstance, in the development of the human race. (*See* Appendix, p. 226.)

Turning from these technical and theoretical questions, I would now, in order to fulfil the purpose of this paper, take up shortly some general points, illustrative of the state of the

medical profession, in its more practical and matter-of-fact aspects at the beginning of the Christian era. Nothing remains to us from which we get so much information regarding the state of medicine generally as the *De Re Medica* of Celsus. This work, in eight books, derives special importance from the fact that it is the first complete medical treatise which we possess in succession to those of Hippocrates, composed four centuries earlier. Aulus Cornelius Celsus, as he is designated in the old Vatican manuscripts, lived partly before and partly after the time of our Lord, from about B.C. 25 to A.D. 45. He seems to have been a man of great culture, and had carefully studied and compiled all medical writings from whatever source. It is noticeable that, though he did not follow their opinions, he speaks with respect of the medical practice of what was to him that of the ancients. He seems to have been the only physician of note since Hippocrates, and is justly esteemed one of the most outstanding men in the ancient world for his ease and elegance in writing on medical and allied subjects. Curiously enough, all his writings, except on medicine, have perished during the barbarous ages. In our own day it is sometimes said that the opprobrium of medical men is that they are not sufficiently educated outside of their own profession. This could not apply to Celsus. But the medical field *per se* was small in his time. Quintilian gives honourable testimony to the extent of his learning. In one of his works, after mentioning the greatest geniuses that ever appeared in Greece or Rome, as Homer, Plato, Aristotle, Cato, Varro, and Cicero, he adds, "Why should I name any more instances? When even Cornelius Celsus, a man of moderate share of genius, has not only composed treatises on all these arts, but has also left precepts of the military art, and medicine. The bare attempt requires us to believe that he understood all these subjects; but to give perfection to so great work is a difficult task, to which no man was ever found equal."[1] Of all his writings, it may reasonably be concluded that those on medical subjects were the most perfect, as being the fruit of his special studies. Not only for beauty of Latin style, but also for medical philosophy and ethics, the study of Celsus was much recommended

[1] Grieve's *Celsus*, p. 6.

to the students of this University not a century ago. He was then an epistle known and read of all medical men. A contemporary of Celsus, referring to one of his writings on the subject of bees, uses this expression, "Concerning which it is impossible to surpass the diligence of Hyginus, the profusion of ornaments in Virgil, and the elegance of Celsus. Hyginus has, with great industry, collected the precepts which lay scattered in the ancients; Virgil has adorned the subject with poetic powers, and in Celsus we find a judicious admixture of both these manners."[1]

It is interesting to feel that this admiration for Celsus should be as great now as it was nineteen centuries ago, and his works still considered a classic of a high order. In the matter of medical detail we can learn little. As was to be expected, his prognosis seems to have excelled his diagnosis. Like the old nurse in our Infirmary, who knew nothing of anatomy or physiology, but of whom it was said that the surgeons themselves were afraid to venture an opinion of prognosis contrary to her view of the case, so do we, in a sense, feel in the presence of Celsus. This kind of intuition in prognosis had he in a marked degree, acquired by careful, nurselike, and continuous study of his patient. That he was a careful student of disease clinically may be gathered from the following sentence in his book:—"From these things it may be inferred that many people can't be attended by one physician, and that the man to be trusted is he who knows his profession, and is not much absent from the patient. But they who practise from views of gain, because their profits rise in proportion to the number of patients, readily fall in with such rules as do not require a close attendance, as in this very case. For it is easy for such as seldom see the patient to count the days and the paroxysms; but it is necessary for him to *sit* by his patient, who would form a true judgment of what is alone fit to be done, when he will be too weak unless he get food," etc.[2]

His judgment as to the use or abuse of drugs, and his knowledge of human nature stamp him a born physician and a father in his profession. The partition wall of nineteen

[1] Grieve's *Celsus*, p. 8. [2] *Ibid.*, p. 14.

hundred years between his time and ours seems to melt away as we read the following maxims he has left us, and we can almost fancy we have the genial old man with us this evening:—"Tis good for a sound man to diversify his way of life; to be sometimes in the country, sometimes in the city, and frequently in the fields; to sail, to hunt; sometimes to rest, but exercise himself frequently—for indolence enervates the body, labour strengthens it; the first brings on a quick old age, the other makes a long youth."[1]

Again: "The contemplation of nature, though it cannot make a physician, yet may render him fitter for the practice of medicine."[2]

"Now, when there is no certain knowledge of a theory a mere opinion about it cannot discover a sure remedy."[3]

"The failings of those who practise medicine are not to be charged to the art itself."

"The physician of experience is recognised by his not at once seizing the arm of his patient as soon as he comes to his side, but he looks upon him, and as it were sifts him first with a serene look to discover how he really is; and if the sick man manifests fear, he soothes him with suitable words before proceeding to a manual examination."[4]

"Little minds confess nothing disgraceful to themselves, for they have nothing to lose. But to a great mind it is befitting to acknowledge even mistakes, especially when the results of medical practice are handed down for the benefit of posterity."[5]

Such aphorisms abound in the *De Re Medica*.

There are many obstetric points discussed, such as the method of extraction of the child after version, the treatment of uterine hæmorrhage, etc., interesting, but not of practical value to this Society in the light of to-day. Unlike his Jewish colleagues, Celsus paid little attention to traditional opinions and speculations. Rather was he the more taken up with the importance of nursing and general treatment. Indeed, it is interesting to note in how many cases ancient notions and treatment joined hands with modern science.

[1] Grieve's *Celsus*. [2] *Ibid*. [3] *Ibid*.
[4] Baas' *History of Medicine*, p. 161. [5] *Ibid*., p. 161.

In a general survey of his works one is impressed with the truth of the maxim, "Much arises which has already perished, and what is now honoured is already declining." But is not this true in our own time? Through the dark ages that have rolled between Celsus and ourselves there have been long periods of retrogression in medical knowledge, but there have appeared also not a few bright stars in the darkness. Now have we reached the day-spring of science, whose morn, with healing in his wings, has little more than dawned, a science at the touch of whose garment the gynæcologist of to-day may receive for his patient more certain relief than in days gone by, yea, in some cases, cure almost miraculous.

Appendix.—Since writing this paper, my attention has been drawn to the accelerating and belating of organs in organogenesis in Ernest Mehnert's work, *Bionechanik erschassen aus dem Principe der Organogenese*, in which considerable light is thrown on the discrepancy in the development of the sexual organs in the Jews, before referred to. The more rapid development of these organs in the fœtus is probably racial and peculiar to the early Hebrews, in whom reproduction and replenishing the earth with people was so important. Mehnert's book is a difficult one, but Professor J. Arthur Thomson, of Aberdeen, in his review of it, in *Natural Science*, May 1898, has given its gist. It is, that the *rate* of growth varied in different parts of the embryo, and *increased in proportion to the physiological dignity or importance of the part or organ.* In referring to a corollary in Mehnert's biogenetic law, Thomson's words are: "That as an organ rises in physiological importance and structural differentiation, it acquires a proportional *increase* in its *rate* of development."

And the converse of this is equally true: "The organ which has lost its functional dignity, so to speak, is handicapped in its rate of development." Or in other words, "Retrogression and retardation go hand in hand."

It is interesting to find in the Talmud a statement on development confirming Mehnert's opinions, which are the outcome of advanced modern study in biological science.

MEETING VIII. JULY 10, 1901.

DR MILNE MURRAY, *President, in the Chair.*

I. The following were elected Honorary Fellows of the Society:—W. Snegurieff, M.D., Professor of Obstetrics and Gynæcology, University of Moscow; D. Von Ott, M.D., Professor of Obstetrics, University of St Petersburg; R. Chrobak, M.D., Professor of Obstetrics and Gynæcology, University of Vienna; H. Fritsch, M.D., Professor of Obstetrics and Gynæcology, University of Bonn; Paul Bar, M.D., Professor of Obstetrics, 122 Rue la Boetie, Paris.

II. DISCUSSION ON "THE MANAGEMENT OF THE THIRD STAGE OF LABOUR."

The President said the object of their meeting was to discuss the very important subject of The Management of the Third Stage of Labour. The reason, probably, that stimulated the Council to select this particular subject was due to the fact, among others, that important questions had been raised by Dr Berry Hart regarding the mechanism of the stage, and these questions had been discussed in an unsatisfactory way by the Society, so far as practical outcome was concerned. The Council deemed this a favourable occasion, when more than the ordinary number of Fellows were present, to discuss the question in detail. Professor Simpson had kindly agreed to open the discussion.

Professor Simpson.—Mr President, ladies and gentlemen, it is right that I should say I yielded to the persuasion of the other members of the Council of the Society in a moment of weakness, overcome by the genial hospitality of our President, who gathered us around his board that we might transact some business, and then somewhat suddenly this task was laid upon me. While I consented, I hardly realised at the time that the meeting of the Society was so near, and the final examinations to be conducted between, so I am not in a position to give you the kind of address I feel is due to the Society and the importance of the subject. I have only been able to put together

some few notes and extracts, which I shall proceed to lay before you.

Capuron,[1] closing his description of the phenomena of labour, in which he had noted the brief calm that succeeded the rupture of the membranes ere the second stage sets in, says, that after the head is crowned at the vulva, "the uterus makes a final effort; the pain is intense; the frenum tears; the woman utters a piercing cry, raises the hips and shoots out of the vulva successively the head, the shoulders, and the trunk of the infant. This moment, the most painful of the travail, is followed by a calm much longer and more complete than the former; the woman has only a sense of delight, or an unspeakable pleasure—that of being a mother. The natural expulsion of the after-birth, which takes place some time after, scarcely disturbs this state, and that of the lochia is still less painful."

But whilst the patient is enjoying this rest and revelling in the joys of motherhood, the medical attendant is very conscious that her troubles and his cares are not yet at an end. So when he has to take up the subject of the treatment of the third stage, Capuron has to expend many pages in showing how the deliverance and its dangers are to be conducted and controlled. And it is not without good ground that Ahlfeld[2] says, "The last stage of labour is just that on whose course the life and health of the woman chiefly depend." I suppose it is this consideration that has led the Council to propose as the subject of our present discussion—The Management of the Third Stage of Labour.

Engelmann and others who have interested themselves in the obstetrics of the uncultured races, tell us of the difficulties that are sometimes encountered among them in connection with this stage of labour, and how the attendants try to overcome them, and effect the delivery of the placenta by pulling the cord, sitting on the patient, kneading the uterus, and administering drugs supposed to be efficacious in favouring its extension. So also, when we turn to the oldest medical

[1] *Cours theorique et pratique d'accouchemens*, 1816, p. 212.
[2] *Berichte und Arbeiten*, 1883, p. 83.

literature,[1] we find in the Hippocratic writings instruction given for the administration of sternutatories, emetics, and stimulants of various sorts, to favour the extrusion of the placenta. When these measures fail, they hesitate to divide the cord and make use of the weight of the child to strain on the placenta, or suspend a weight to the cord if it has been torn across. They note cases, however, where the placenta had to be left *in utero*, to be expelled in a decomposed condition after seven or eight days had elapsed. Celsus gives instruction to pull with the left hand gently on the cord whilst the fingers of the right pass up to the placenta to loosen its vessels and pull it out. Soranus recommends gentle tractions on the cord, and where this fails, introduction of the hand into the uterus to loosen and extract it. Where the orifice is closed, injections and fumigations may be used and a great variety of medicines administered; or, eventually, the placenta may be left to be expelled spontaneously by decomposition. So on through the dark ages; and when we come to the first text-book on Midwifery by Rösslin, we find him saying, according to the translation by Raynalde in his *Byrthe of Mankynde*, 2nd book, 5th chapter:—

"And if it be so that any part of the secondine do appear let the midwife receive it tenderly, loosing it out easily and softly lest it break; then let the midwife tie that part of it which she hath handfast to the woman's leg or foot, not very straight lest it break, neither very lax lest it slip in again, and then cause her to sneeze. But now, if the secondine tarry or stick so that it come not quickly forward, then loose it a little and a little, very tenderly, wreathing it from side to side, till such time as it be gotten out, but ever beware of violent and hasty moving of it, lest that, with the second birth, she remove the matrix also."

The famous French midwife, Louise Bourgeois, gives instructions which are reproduced in the English translation, *The Compleat Midwife* (section iv. chap. vii.), in these terms:—

"The child being drawn forth in safety, the midwife must now apply herself to the drawing out of the secundines, which must be done by wagging and stirring them up and down, and

[1] See Ploss, *Das Weib in der Natur und Völkerkunde*, IVte Auflage von Bartels, 1895, vol. ii., p. 210.

then gently drawing them forth, causing the woman to take salt in both her hands, and to shut them close, and then to blow in them, whereby you shall know whether they be broken or no. It may be done also by causing her to put one finger in her mouth, to provoke a desire of vomiting, or else by stirring, as when she is doing the ordinary needs of nature, or as nature itself constrained her to do, before the head of the child was come forth. All this must be done speedily; yet if this be not sufficient, she may take the yoke of an egg raw, or she may take a small draught of raw elder-water, or you may cause her to smell to a piece of assafœtida. If she be troubled with wind cholicks, or have taken cold, which oftentimes doth breed wind, which is a great hindrance to the coming forth of the secundines, the midwife ought to chafe the woman's belly with her hand, which does not only break the wind, but causes the secundines to come down. If this fails, the midwife may with her hand dilate the exterior orifice of the womb, drawing it forth gently and by degrees."

On the whole the tendency was towards an expectant treatment of the retained placenta until the masters of obstetrics in the seventeenth century, noting the dangers of delay, began to practice and to advocate more active interference. The systematic intervention for immediate delivery of the placenta was especially insisted on by Deventer,[1] who describes his practice, and defends it in these terms:—

"Omitting all other endeavours, let the hand presently after the birth of the infant be passed into the womb; and if any one asks, Why presently, I answer him:—

"1. If presently after the birth of the infant I pass my hand into the womb, it slips in easily, nay, and the arm if there be occasion without any trouble; for the head of the infant hath opened it sufficiently. On the contrary, whilst all those tricks are tried which authors mention, the mouth of the womb is so closely shut up that you cannot penetrate it without a great deal of trouble.

"2. After the birth of the infant you may pass your hand into the womb without any pain or inconvenience to the woman, which if delayed is not done without a great deal of incon-

[1] *Midwifery*, chap. xxviii.

venience, because she cannot bear the relaxation of the mouth of the womb without a great deal of trouble.

"3. After the birth of the infant, the mouth of the womb is not only open enough, but the womb itself, which otherwise gradually contracts and grows less, closely binding up the secundine in itself, so that that which before was smooth and broad, and adhered to the bottom of the womb like a cake, is then long and small, as if you squeezed a cap together in your hand, or tied a purse, so that afterwards it is harder to reach the bottom, which happens not if your hand is presently passed in.

"4. If the hand is put up presently after the birth, there is no danger, by drawing the navel-string, of drawing down the bottom of the womb, and inverting it, which too often is occasioned by unwary midwives, who through their ignorance persuade themselves that another infant is coming forth, thinking that the bottom of the womb is a head.

"5. If my hand is presently after the birth put into the womb, it assures me whether the after-birth adheres to the womb or not, which, if I find loose, I presently draw out my hand, holding it betwixt my thumb and the rest of the fingers of my right hand, whilst I gradually draw the navel-string with my left, by which method it is thrust out without any trouble to the person.

"6. If the hand is presently put up into the womb, I soon perfect the birth, for it is certain I can sooner extract the after-birth than another who draws it out or tries other ways; for I do not spend time in trying this or that method, but proceed in that which is the shortest and most certain.

"7. This method of drawing it out presently satisfies me whether one or more infants are to be brought forth, or whether a mole or a dead infant remains behind, all which I can bring out before or after the secundines, as there is occasion.

"8. By this means, besides bringing away the secundines, I can presently do that in the womb which I commonly used to do after the birth, therefore because I think it safe and useful to put in the hand sooner or later, I think it most advisable to do it presently after the birth."

The obstetric world was for a time disposed to follow

Deventer's example. But it began to be seen that whilst this kind of interference in the hands of a master might be carried out with safety, it was attended in the hands of the general practitioner too often with disastrous consequences, and during the eighteenth century there were prolonged controversies as to the proper period for active intervention during the third stage of labour. Deventer's countryman, Ruysch, who thought he had discovered a muscle in the fundus uteri whose special function it was to extrude the placenta after the child was born, would not have his muscle interfered with, and maintained that the placenta should never be removed artificially, because of the danger of prolapse and inversion of the uterus. In our own country, William Hunter took a prominent part in the reaction against early and artificial delivery; and the expectant treatment is advocated in 1767 in these terms by Dr John Harvie, a London teacher of midwifery, whom Wallace Johnson calls Smellie's successor:—

"My pupils, who deliver many poor women, according to my instructions, have of late left the delivery of the placenta to nature. In general it comes away soon; but if, after waiting an hour, there is no unusual discharge, they order the woman to be put carefully to bed, and then leave her. In such cases, I have not known of any placenta that has remained longer than nineteen hours; and all the women thus treated have recovered to great advantage. Is it not, therefore, reasonable to believe that nature would complete this part of her work with safety, as often, if not oftener, than she does the delivery of the child? Would it not then be the most rational and judicious practice? Undoubtedly. And every judicious and experienced practitioner will in time be convinced that there is but one objection to it, viz., its novelty. Women have not been long and generally used to it; for which reason they will be afraid of it; and if any case should turn out disagreeably, they and their friends will exclaim against it. This prejudice, I am convinced, is now all that we have to combat with. Long imbibed prepossessions render this extremely difficult; as women, if the smallest portion of the placenta or its membranes be left in the uterus, have been used to think themselves in the same danger as if no part of them had been delivered. However, it frequently

happens that a part and sometimes the whole of the membranes are torn off and left behind, even in cases where the cake is delivered by nature alone; yet I never saw any bad consequences from these incidents.

"In the following manner, nature may be greatly assisted, and without any addition of pain. After the child is delivered the navel-string tied, and the child given to the nurse's care, take the navel-string in your left hand, gently pull down its loose part till you feel that it is a little tightened, and by it guide the forefinger of your right hand; thus you will commonly feel that a part of the placenta is fallen into the os uteri, and often that portion of it into which the navel-string is inserted. In either case, by gently pressing the finger against the part felt, and continuing the pressure in the direction of the axis of the pelvis, that is, downwards or backwards, it will presently fall out of the uterus; and then it may be easily slipped out of the vagina by the same finger. From the largeness, thickness, and figure of the placenta, or from its coming into the os tincæ in a double manner, it would now and then stick for a long time in that situation, unless assisted in the way I have recommended. When it falls down in this manner it will likewise be particularly necessary to insinuate the point of the finger so as to get it above the edge of the placenta, and thus hooking it down to reduce it to a lesser bulk. Sometimes the edge of the placenta may be easiest come at by passing the finger up underneath the ossa pubis, at other times by passing the finger backwards or towards the sacrum. There is another safe method of assisting nature in the delivery of the placenta, and which for these five or six years last past I have found to answer generally very well in practice. As soon as the child is committed to the care of the nurse, let the accoucheur apply his hand upon the belly of the woman, which is then very loose, and he will readily feel the contracting uterus; then having placed the flat of the hand over it, let him by a light or gentle pressure bring it downwards, or towards the pubes, and he will feel the uterus sensibly contracting, and often will feel it so reduced in size as to be certain that the placenta is expelled. By this method we will seldom have anything to do afterwards but to help it through the os externum, if even so

much remains undone. After the placenta is thus delivered it may be advisable to apply the hand, as before, upon the belly; and if the uterus is found to be too large, the pressure, cautiously repeated, will expel the greatest part of the coagula, which produced this increase of bulk. Thus nature herself, or assisted in one or other of these two methods, will not near so often as once in a hundred times fail in doing this part of her business; and even in that one case, of so great a number, were she left entirely to herself, it is more than probable that, in the end, her work would be safely accomplished. By this treatment many women would be saved who now lose their lives, from the placenta's being forced away by the introduction of the hand.

"When the placenta is delivered by nature alone, or with that sort of assistance which we have recommended, in general it comes away inverted; that is, the side which was in contact with the child comes first, and the side which adhered to the uterus is covered by the membranes; thus the lobular side is rendered smooth, and, of course, slips away with ease, and perfectly whole. If the placenta be separated with force, and brought away by the hand, the reverse takes place; that is, the lobular side comes away first; which is thence liable to be torn, and some part of it even to be left behind.

"It is generally recommended to the practitioner in midwifery to show the placenta before he goes away to some of the females present. This must, no doubt, give satisfaction. But it is not my business to teach what good sense or common discretion and prudence will tell every practitioner."

In 1769 Dr Wallace Johnston says, in his *Midwifery*, p. 200 :—

"The patient must be directed to compress her abdomen with both her hands, as equally as she can, descending from the epigastric to the umbilical region. When this pressure has been made about ten minutes she may fetch a deep breath, retain it, and force down while the operator assists as follows." The directions for the operator are to pull on the funis for half a minute at a time, at intervals of three or four minutes; "and when this has been repeated," he says, "once or twice, the compressure on the abdomen must be made lower; as, for instance, more directly on the hypogastric region; by which means the

placenta will generally come forth in about ten or fifteen minutes from the birth of the child, unless its adhesion be very firm; if it is, the uterus may be felt bulky towards the umbilical region; and therefore one hand of the operator must be applied now, instead of the patient's, on the outside of the abdomen, to make as equal a compressure upon the uterus as he can, and to bring its fundus down at the same time towards the pubes, whilst the funis is tightened below with the other hand. By this means the expulsive power of the uterus is commonly so much assisted as to make the placenta descend into the pelvis, and then advance through the vagina, especially when it comes obliquely, or with one edge foremost." He adds in a note that he had used this method for some time, and had "the pleasure to find the propriety of it confirmed by the practice of Dr Hunter and Dr Harvie, the latter of whom appears to have been the first who recommended it in his lectures."

Later on (p. 204), in treating of cases that had called for artificial removal of the placenta with the hand *in utero*, he acknowledges: "Had I sooner known the method of assisting by compressing the abdomen, I might probably have succeeded in some of these cases without introducing the hand."

In 1772, Charles White of Manchester wrote, that when a pain comes on after the birth of a child, "the secundines will be easily extracted by gently pulling the navel-string, and here an easy pressure upon the abdomen by assisting the uterus to contract, will be of service. If the placenta be very large, a finger may be introduced to bring down the edge of it as soon as it is within reach. . . . I can with satisfaction declare that in the years during which I have proceeded in this manner, I have never had occasion for the manual extraction of the placenta. I have never left my patient till it came away, nor have I ever been detained a single hour by it." He warns against the dangers of a purely expectant treatment, and gives some illustrative cases, such as this: "An ingenious surgeon told me he delivered a strong, healthy country woman of a fine child as she sat on the knee of an assistant. He made no attempt to bring away the placenta, having been instructed by a teacher of midwifery that leaving it behind was never productive of disagreeable consequences. After waiting a consider-

able time for its exclusion, no bad symptoms appearing, he left her as he thought in perfect safety; but in the middle of the night she began to flood extremely, and he was again sent for. He made what haste he could, but, living several miles from his patient, he came too late. She was dead, and the placenta unexcluded."

In 1783, Dr Dease of Dublin, in his *Observations on Midwifery and the Disorders of Women and Children*, said:—

"After the child is delivered and the woman somewhat rested, our attention will naturally be directed to the delivery of the placenta. For this purpose it will be proper to examine the volume the uterus makes above the pubis; if the uterus descends and forms (as it were) a hard round globe, it is a just criterion of its contraction, which will gradually detach the placenta, which after some time will drop into the vagina, and with some gentle efforts of the woman be gradually expelled. This operation of nature for obvious reasons is generally sooner effected after a slow labour than a quick one. We should never in general attempt delivering the placenta until by feeling over the pubis we find the uterus in a round, hard state of contraction, that the woman has some pains, and that we find some part of it engaged in the os uteri so that it has been detached, and all we have to do is to favour its expulsion. Should the detachment of the placenta not be effected in the usual time, it will be much facilitated by the operator's judiciously applying his hand to the region of the uterus, which he may excite to the necessary contraction by gentle friction, and by introducing two or three fingers between the os uteri and the placenta, at the same time gently drawing and inclining the umbilical cord towards the sacrum; when it has descended into the vagina, care should be taken not to leave the membranes behind; this with a little caution is easily effected by twisting the placenta gently during its extraction."

In the latter half of the eighteenth century different lines of practice were thus pursued and advocated by different practitioners and teachers, so that, as one of my predecessors—Professor James Hamilton,[1] points out, two famous London obstetricians, who were for many years joint-lecturers, enun-

[1] *Practical Observations in Midwifery*, 1840, p. 161.

ciated diverse views as to the treatment of the placental stage; for whilst Osborne expressly says, 'Under no circumstances whatever ought the placenta to be permitted to remain in the uterus for any considerable length of time after the birth of the child,' his respected colleague, Denman, says, 'If the placenta be not expelled at end of four hours from birth of the child it is generally wise to determine upon extracting it; and the determination of choosing that time is, I believe, to be founded on the opinion that the parts have not closed since expulsion of child. I can, however, recollect many examples of a retained placenta without a hæmorrhage to which I have been called at any time within twelve or even twenty-four hours after birth of child, in which the placenta has been very easily managed, when the exigencies of any case required it.'

The war that was waged in the eighteenth century between the advocates of the active management of the Third Stage and the advocates of the expectant line of treatment was repeated under new conditions in the nineteenth. Professor Crédé, aware of the dangers incurred by delay in the emptying of the uterus, and taking note of the still greater dangers attendant on the forcible extraction of the placenta, whether by pulling on the cord or passing the hand into the cavities to lay hold of the placenta itself, began, in his *Klinische Vorträge ueber Geburtshülfe* in 1853, to advocate the treatment of the Third Stage by procuring the expulsion of the placenta by means of pressure on the uterus from above. At the meeting of the Naturforscherversammlung in Königsberg in 1860, he brought the results of his observations and experience so effectively before his fellow-countrymen that his practice was speedily adopted in almost all the obstetrical clinics and schools in Germany. The Crédé practice requires the application of the left hand of the accoucheur to the fundus uteri immediately after the birth of the child, to ascertain that contraction and retraction are in progress. When he has satisfied himself on this point, he occupies some time in the deligation and division of the umbilical cord, and then applies his hand more continuously to supervise, and when necessary to enforce the uterine activity. In normal conditions the uterus acts with sufficient vigour to separate the placenta from its

surface and expel it from its cavity in a few pains, when the practitioner through the medium of the contracted and emptied uterus may squeeze the placenta out of the vagina and through the pudendal orifice.

Perhaps Crédé himself erred in having recourse to too early and too frequent interference with the natural efforts; and certainly in the hands of his followers the method was seen to be attended with some of the dangers which had discredited the time-honoured method of extractive interference. Sometimes portions of the placenta were left *in utero;* more frequently the placenta was expelled entire, but leaving behind it larger or smaller sheets of the membranes. The uterus is said to have been inverted; and it has been maintained that a greater loss of blood took place under this mode of treatment than in cases where the process was left entirely to the natural efforts. So it came about that in the seventies, Dohrn, Freund, and especially Ahlfeld, began to lift up their voices against all active interference in the Third Stage, and to advocate the leaving of the extrusion of the placenta to the natural efforts of the parturient powers.

The controversy, as became the more scientific character of the time, was attended with closer observation of the mechanism of the separation and extrusion of the placenta. It was recognised that as the secundines escaped from the *vulva* they were usually inverted, so that the amniotic surface of the placenta first appears with the cord attached to it, and the uterine surface, with more or less blood adherent, is covered with the inverted membranes. Schultze, in his famous wall-plates, has represented the after-birth as escaping from the *uterine cavity* in the same fashion, with an abundant effusion of blood or retro-placental hæmatoma in the inverted decidual sac. This method of extrusion of the placenta through the os uteri—"Schultze expulsion"—may take place in special cases of fundal or nearly fundal insertion of the placenta; but in general the placenta is folded back on its amniotic surface, and escapes with its lower margin, or a part near the lower margin, coming first through the os, as was pointed out by Lemser, and confirmed and figured by Duncan—"Duncan expulsion." The lower down on the uterine wall the

implantation of the placenta, the nearer will its first presenting part be to the lower margin; the higher up, the greater will be the tendency to inversion of the placenta and membranes as they travel through the cervix.

There is pretty general agreement as to the mode of *expulsion* of the placenta: the mechanism of its *separation*, however, is still matter of controversy. This has been studied on frozen sections, on uteri removed in Porro's operation, and by introduction of the hand into the uterus after the birth of the child as well as by application of the hand to the uterus through the abdominal walls. Ahlfeld, finding in a Porro uterus that detachment seemed to have begun in the centre of the placenta, holds that the separation normally begins there and is completed, as the result of an effusion of blood between the uterus and the placenta, giving purchase for the further contractions of the uterus. But blood extravasation is no necessary element in the mechanism of placental detachment. In many cases the separation occurs in the absence of any retro-placental hæmorrhage whatever. Fluid blood is no stimulant to uterine contraction: its presence in the cavity seems rather occasionally to favour as well as result from uterine inaction.

We must find in the direct action of the uterus on the placenta the cause of the separation. Dr Hart has maintained with great ingenuity and vigour the idea that the separation results from an expansion which occurs in the uterine wall after each contraction, and which the placenta is unable to follow, and so is shed. Dr Slight has recently suggested that the uterine wall is passive at the placental site, and becomes stretched during the uterine systole to such a degree that the placenta separates from its surface. But I believe that Dr Barbour has more correctly given expression to the method in which the uterus effects the separation and extrusion of the placenta from its interior, when he says[1]: "That the placental site can shrink to an absolute area of 14 or 21 square inches without separation, and that this may be either rather less or rather more than one-half of its area before labour had begun, are anatomical facts, but not nearly so significant as the

[1] *The Anatomy of Labour and its Clinical Bearing*, 1899, p. 99.

following one—that with this amount of retraction the uterine wall embraces the placenta all round. In other words, the placenta has not become separated before the uterus begins to act on it *as a whole*. When this has taken place, the operating force is no longer retraction of the site alone, but retraction of the walls throughout: the uterus of the Third Stage now acts on the placental mass, and there is no uterine cavity in the sense of an empty space into which the placenta can arch itself, for the uterus grips the placenta on all sides."

Now, as regards the management of the Third Stage, Ahlfeld and others would have us follow a purely expectant treatment, and abstain from any interference in ordinary circumstances. Ahlfeld has rendered most important and valuable service in indicating the propriety of inspecting the whole genital canal to ascertain possible sources of hæmorrhage other than that resulting from the necessary laceration of utero-placental vessels, and in discussing the best methods of dealing with such hæmorrhages; and still more in demonstrating that the placenta may be left for lengthened periods, as Dr John Harvie had declared a century before, without endangering the patient's comfort or her life. According to this method, when the practitioner has satisfied himself that there is no undue hæmorrhage from the uterus, and that he has used the proper methods for controlling hæmorrhages from other sources, he simply sees to it that the patient is cleansed and made comfortable with a carbolised dressing applied to the pudenda, and that the umbilical cord, compressed with a pincer close to the vulva, is laid on the patient's left thigh. A nurse from time to time looks at the dressing, and judges from the lengthening of the cord between pincer and vulva of the descent of the placenta, until she judges—usually in one and a half or two hours—that the after-birth is ready to escape from the vulva. A bed-pan placed below the patient then receives the secundines that escape by a straining effort of the patient, assisted if need be by pressure on the pelvic organs from above the pubes. But whilst such a line of treatment may be safely and conveniently carried out in a Maternity Hospital, it will hardly commend itself to the every-day practice of the medical practitioner, who knows that he can

promote progress, to the patient's immediate relief, without interference with natural forces or the introduction of any element of danger, and who knows, further, that so long as the placenta is *in utero*, there is the risk of hæmorrhage, and that its extrusion or extraction become more difficult with the lapse of time.

We may say, in general, that when an hour has passed after the birth of the child with the placenta undelivered, it is time for active intervention. There can be no definite time limit set, however. Each case must be dealt with according to emergent conditions; and whilst in some instances the attendant may patiently wait on for two hours and more, in others he is justified, and sometimes compelled, to interfere, it may be only after the lapse of ten or fifteen minutes. If the second routine ligature on the umbilical cord be applied to it close to the vulva, he can see by the lengthening of the cord that the placenta is descending, whilst the hand applied to the body of the uterus recognises that it is disembarrassing itself of its contents. When he finds that the uterus has emptied itself and become retracted and firm, he can use it as the medium by which, through the abdominal walls, he presses on the secundines that are now lying loose in the vagina and effects their complete expulsion through the vulva. If he now examines the placenta and membranes, and satisfies himself that they are entire, as is usually the case, within half an hour of the birth of the child, the patient is tidied, bandaged, and put to rest. The sanitary pad or diaper that has been applied to the pudenda is looked at once or twice during the next half-hour, and when there is no undue oozing, and he finds the uterus retracted, he leaves at the end of the hour with an easy mind.

If there be undue placental hæmorrhage, it will be dangerous to wait for the spontaneous separation and expulsion of the placenta. On the other hand, where more than the usual length of time is passing without placental detachment, the practitioner has to bethink himself of the possible causes of delay. There are four main sources of difficulty, in two of which the powers are at fault, and in two the passenger. The parturient Power—the uterine muscle—may be ineffective.

first, from total inertia, whether this be due to the labour having been too protracted in the earlier stages, or too hurried in the second stage; or *second*, from irregular so-called "hour glass" contraction, when the muscle over the placental area is inert whilst in the rest of the uterine wall it is active. The Passenger — the placenta and membranes — may, *first*, be morbidly adherent; or *second*, the placenta may have unfavourable attachment, either as regards its extent or its site on the uterine wall. There may be a combination of these faults in some cases, as when the placenta is morbidly adherent in some of its lobes to a flaccid uterus, or when a placenta is found spread over an unusual area in a thinned membranous state and at the same time morbidly adherent.

So long as the placenta remains *in utero*, whatever may be the cause, the medical attendant could not leave his patient with a perfectly easy mind. For he knows that though as yet there has been no placental hæmorrhage, hæmorrhage is almost certain to arise when the detachment begins; and if he be not at hand to deal with the condition, such disastrous consequences may follow, as in the cases recorded by Charles White, ere he can come to the rescue. In all the cases of urgency or of undue delay, whilst some aid will be obtained by the administration of ergot or its derivatives, by the use of hot douches, or even application of the infant to the breasts, no measure will give such sure and satisfactory results as the application of the hand to the uterus to stimulate by massage, to feel contraction, and, when the contractile hardening is recognised, to add to the uterine force by firm compression, perhaps with both hands grasping the uterus over the fundus and anterior and posterior walls, so as to procure the separation and expulsion of the placenta.

When Crédé advocated this measure of dealing with the placenta in all cases of labour, he expressed the too sanguine expectation, that if the practice came into general use the spectre of adherent placenta would be scared away from the domain of midwifery. Too sanguine; because there are cases, especially those where the placenta is badly implanted over an extended surface where uterine action, however enforced, cannot bring about the separation, and where this can only be accom-

plished by the hand introduced into the uterine cavity. Still, abundant experience has shown that in demonstrating the wide applicability of separation and extrusion of the placenta by external manipulation, Crédé made a very notable contribution to the resources of the practitioner of midwifery.

His method was first brought definitely under the notice of obstetrical Britain in a paper which I read to this Society in 1863. In the following year a communication on the subject was made to the London Obstetrical Society by Dr Eastlake, who made free use of the facts and authorities I had already published. M'Clintock, editing the works of Smellie in 1876 (p. 236), condemns traction of the cord, and commends as "a far safer and more efficacious way of getting off the placenta, that which has been practised from time immemorial at the Dublin Lying-in Hospital. It consists in pressing and squeezing off the after-birth by external compression of the uterus with the hand." Founding on the passage I have already quoted from Dease, and referring to a passage in Hardy and M'Clintock's *Practical Observations on Midwifery*, he claims[1] for this manner of dealing with the Third Stage the designation of the "Dublin method." The paragraph (p. 22) is headed *Hæmorrhage between the Birth of the Child and the Expulsion of the Placenta*, and reads: "Different causes, some the result of bad management, and others of an unavoidable nature, may give rise to hæmorrhage at this period. It is unnecessary to enter into an enumeration of these, as they are sufficiently well known; but, from whatever cause arising, the principles of treatment have been always the same, namely, to bring about the contraction of the uterus, and, if the means adopted for this purpose failed in checking the flow of blood, to remove the placenta. In every case of hæmorrhage prior to the coming away of the placenta, the first object has been to grasp the uterus with the hand (or get a competent assistant to do so), and next to ascertain by careful examination whether the insertion of the cord was within reach or not, as this will materially affect the danger of the case. . . . Having placed the hand on the fundus uteri, friction and slight pressure

[1] See also an interesting paper by Dr Jellett in the *Dublin Journal of Medical Science*, June 1900.

are to be made, and if the amount of contraction thereby induced be not sufficient to repress the hæmorrhage, it will be necessary to expel the placenta from the cavity of the uterus. In doing this, the organ must be grasped firmly, and pressure exerted upon it in the axis of the brim of the pelvis. If the uterus have fallen to the left side, as not uncommonly happens, it must be raised into its natural position before commencing to exert compression upon it. It will also tend much to the success of the manipulation if it be performed during the presence of uterine action; indeed, we have sometimes been surprised at the ease with which the placenta was pressed off during a contraction of the uterus, where previously it had withstood our best-directed efforts. These measures we have seldom found to fail in getting away the placenta, unless it be morbidly adherent—or, at least, in bringing it to the os uteri within reach of the finger, which is almost the same thing, as its complete removal can then be effected at any moment without delay or difficulty."

The paragraph, therefore, discusses the management, not simply of the Third Stage, but of special cases; and if we consult Churchill as a representative of the Dublin school, we find him give these directions for the management of the Third Satge:—

"The hand should be placed upon the abdomen to ascertain (from the size of the uterus) whether there be twins; if not, we may proceed to apply the binder, which should embrace the hips inferiorly and the whole abdomen. It should be pinned firmly, but not too tight, and be kept on during the whole time the patient is in bed. . . . Before applying the binder, or immediately afterwards, the uterus should be firmly grasped, and firm pressure made in the direction of the axis of the brim. In most cases, as the placenta has been detached by the last pains, it will be felt to recede under the hand, and the after-birth will be found in the vagina or in the bed. If not, the nurse should be directed to make pressure as soon as the binder is applied, and we should make firm but steady, and not excessive traction by the cord. I have adopted this practice for twenty years, and rarely have the placenta detained more than five minutes, nor have I had a case of hæmorrhage during that time. If we wait some time before

making pressure, the uterus closes over the after-birth enough to retain it, but not enough to expel it."

Now whilst the masters of the great Dublin school, like Clarke, Collins, etc., deserve all credit for their advocacy of compression of the uterus in aiding the separation and extrusion of the placenta, I cannot justify M'Clintock in identifying with the Crédé method what I described in my paper in 1863 as "the British practice of following down the uterus with the hand, and thus aiding the contraction of the uterus in the expulsion of its contents by external pressure," a practice which was conjoined with traction on the umbilical cord or placenta. It has always seemed to me that the great value of the Crédé method lay in doing away entirely with the dangers (1) of traction on the cord, and (2) of introducing the fingers into the lacerated genital cavity.

1. As regards the danger of pulling on the cord, I will only refer now to the risk of its giving way. Its tensile strength is not so great as might be supposed. A quarter of a century ago my friend, the late Dr James Sidey, brought me an umbilical cord which he had torn off a placenta without, as he thought, exerting almost any degree of force. At that time I took occasion to test the strain at which the cord tore through in a series of cases. A spring balance was attached by a string to the fœtal end of the cord, and whilst an assistant grasped the placenta the balance was pulled till the cord gave way. The degree of resistance was very variable. But what is important to observe is, that whilst the cord will sometimes bear a strain of over 18 lbs. without being torn, it may, on the other hand, give way under a pull that is less than 2 lbs. in weight. In one-fourth of the cases thus tested it yielded with a pull of 4 lbs. and under.

2. With regard to the introduction of the hand or fingers to lay hold of the placenta, whilst every practitioner knows how to lessen the risk of septic inoculation by thorough disinfection, he knows also that he can better secure the results of an aseptic accouchement if he can get the placenta extruded without touching even the vaginal mucosa. This is what Crédé has taught him to do.

The President said he thought they would agree with him that, in spite of press of work, Dr Simpson had introduced the subject as well as possibly could be. He had given points on which there was difference of opinion, and which no doubt they would have expiscated by-and-by. The Secretary had issued a request that gentlemen who proposed to take part in the discussion should hand in their names. The invitation, however, was responded to by very few. He asked Professor Kynoch, Dundee, to make the first contribution to the discussion.

Professor Kynoch said, in discussing the third stage of labour they naturally thought of two processes—the separation of the placenta, and its expulsion. The cause of the separation of the placenta hardly came into consideration in discussing this subject. He would not refer to the theories as to the mode of the separation of the placenta; but, believing as he did that uterine retraction and contraction were essential for separation of the placenta, he considered this was best left to uterine action alone. He had no hesitation in saying that Crédé's method as originally carried out was associated with very great risk. When he had adopted the plan of immediate expulsion of the placenta, he had frequently observed retention of membranes and hæmorrhage. In his own private practice he gave the uterus a chance of separating the placenta, and found as a rule that in half an hour this was performed by the uterus itself. Having ascertained by means of tying the cord at the vulva after the birth of the child, and by diminution in the size of the uterus, that the placenta was no longer in the uterus, there was no harm whatever in then expelling it by pressure. In his hospital practice he generally adopted the expectant method as safer teaching for nurses than Crédé's method, which they might carry out at too early a period, with the bad results already mentioned. His practice was, to follow down the uterus during the birth of the child—to control the uterus, but not exert any pressure on it—so as to ascertain the condition of relaxation and contraction; to leave matters for half an hour or so, and when he had ascertained that the placenta was separated, then expel it by pressure from above.

Dr MacVie said, that when he wrote to the Secretary saying that, while he had not much to contribute in the shape of novelty to the discussion he would be glad to take a part in it, he hardly expected to be called upon at such an early stage. He found he was far less inclined or able to take part in this discussion after having heard Dr Simpson's address than he was when he wrote that letter. He thought that one might say if they scratched a medical man at whatever stage, they found the student, not merely the student of the pathological states, but the real student, the *civis academiæ*. So, when listening to Dr Simpson he found himself the same as when he was on the benches, listening with unquestioning attitude to anything he said, and prepared to adopt it whenever he had an opportunity. He accordingly found himself inclined to agree with all that Professor Simpson had said. It corresponded pretty accurately to what he had heard a good many years ago. Still, when one began, after having left college a few years, on their own initiative to break very slightly away from what they had been taught, to adhere less to rigid rules, and took the liberty of exercising a little freedom of action, one came to find out how much the actual facts resulting from experience squared with what they had been taught. The first remark he made on the discussion was, that it seemed to him unnecessarily narrowed down to the simple management of the third stage. They might fitly have put in by way of preliminary, that the management of the third stage might begin even before the first stage began. Dr Ballantyne had promised a paper on hæmophilia and he was treating these cases so as to have less to do with stopping hæmorrhage during the third stage. He thought there were cases where chloroform had to be given in the second stage; and where it was prolonged, and where a considerable amount of uterine inertia was probable, the third stage might be anticipated by an injection of strychnine or ergot, to give the uterus power to act at the proper time and expel the placenta. However, these had not been touched upon, and the actual management of the third stage seemed to him to resolve itself into this, that the third stage was as capable of being managed by natural processes as the first stage or the second stage. He thought that was the one fact to be carried in mind, and that

when there was any interference practised it should be on cause shown—that they must have warrant for interference in some abnormality that was threatening the patient. Having found their justification, then was the time to proceed. He was glad to hear Dr Simpson say that sometimes he took away the placenta in five minutes, ten minutes, or even half an hour. He thought every general practitioner would protest most emphatically against having to conduct any case of labour on a time allowance. After the child was born there was certainly usually a period of waiting, not merely waiting but watching; but it was the uterus that was to be watched, and not the clock. Of course the uterus had to be watched to see if it was contracting. If it did not contract very readily, then it seemed evident that was not a natural condition of affairs, and the contraction had to be assisted. The easiest way to assist the contraction was by some form of stimulation from without. If it had contracted well, and the uterus had expelled the placenta, and the placenta was lying loose in the vagina, he saw no harm in using the cord and pulling it away. As to using the cord as a means of pulling away the placenta at an earlier stage, it had to be pointed out that they were not pulling on the placenta really but on the uterine wall. If the placenta was so placed with regard to the fundus uteri, and the cord so implanted with regard to the placenta, it was quite possible they might be pulling directly on the part of the fundus that would most easily invert the uterus. Yet at the same time, when pulling in that position they would pull in the direction that would most easily detach the placenta. That was to say, the position of the placenta on the uterus and the implantation of the cord on the placenta might give them a position by which the placenta might be more easily detached if they pulled at right angles, yet that was the most dangerous position in which to use the cord. On the other hand, they might conceive of the placenta being implanted low down on the uterine wall. In that case they pulled in the line of the uterine wall, and in a direction which least of all would separate the placenta, and yet that would be the safest position to pull the cord. So the safe position in which to pull the cord was the most useless, and the most effectual position to pull the cord so as to detach the

placenta was the most dangerous. Hence the best practice was not to make traction on the cord at all, unless the placenta was lying loose in the vagina.

Dr Ritchie said he was interested in Dr MacVie's remarks, that the management of the third stage of labour might begin before labour. At all events they might try during pregnancy to prevent one of the dangers which arose during the third stage, in hydramnios, twin pregnancies; or, if they knew that the patient was accustomed to bleeding, they should during the latter weeks of pregnancy give strychnine. The London practice was to give strychnine and ergot in such cases. He might say that his management of the third stage was modified somewhat since he was a student, and in this respect: he was not in such a hurry now to bring the placenta away as he was when he began practice. He agreed with Dr Simpson and Dr MacVie that there should be no time limit. If they had very prolonged or very rapid labour, their duty was to wait a much longer time than in a perfectly normal labour. His own practice was, that immediately after the birth of the head he attended to the child's eyes and mouth, and when the child was born, he instructed the nurse to put her hand over the uterus while he got the cord tied. Then he put a small basin at the vulva, and kept it under observation, with the bed-clothes as little open as possible; he kept his hand over the fundus uteri, not to compress it but to see that it was not dilating because of internal hæmorrhage. If the patient was going on well, and there was no hæmorrhage, he was willing to wait a long time and let nature do what it could. He preferred never to interfere, and never made traction on the cord. Dr Kynoch had objected to the Crédé method. For his part, he did not see why he should object to it unless it was applied immediately after labour. If the placenta would not come away after a reasonable time, he did not see any objection to increasing the force by pressure on the fundus uteri, and he acknowledged that if the uterus was contracting and the after-birth was not coming away, he compressed it. If that was not successful, he inserted his hand and endeavoured to get the lower portion of the placenta and pull it down. Sometimes, although there was

no hæmorrhage externally, and the uterus was contracting fairly, they would find from its increasing size or from the feeling of fluid between contraction, that it was gradually becoming filled with blood. Such cases required active interference, with the view of hastening the emptying of the uterus. These cases afforded a strong argument in favour of what Dr Simpson had said, that blood-clot had little to do with the separation of the placenta; because if the clot did help the separation, this was the very kind of case in which the placenta should readily separate, which was contrary to experience. Another argument against the theory that clot aids the separation of the placenta was furnished by those cases in which there is rapid separation of the placenta with the loss of scarcely a teaspoonful of blood; on examination no clot is found adherent to the placental cake, and the hæmorrhage was small until after the placenta came away. If the uterus was exhausted, or there was a very rapid labour, one's duty was to wait till the uterus had contracted and retracted, and if possible do the work needed. The third stage was ordinarily described as lasting from the birth of the child to the birth of the placenta. Practically he considered it lasted longer. He watched the uterus carefully, and did not apply the binder for several minutes, because there was a greater danger of the uterus filling up soon after the birth of the placenta than later on. He had listened with very great interest and great pleasure to the admirable introduction which their beloved professor had made, and it was quite a pleasure to listen to him again.

Dr Foulis expressed regret that Dr Berry Hart had been unable to be present to take up a position more or less antagonistic to the principle Dr Simpson had laid down as regarded the management of the third stage of labour, for Dr Berry Hart had brought before the Obstetrical Society some heterodox and serious principles as regarded the anatomy and physiology of the uterus, on which the management of the third stage of labour depended. They could not be on firm ground so long as there was any doubt as to the physiology of the uterus during the third stage of labour. Dr Simpson held to the view he had taught them as students, and which

they all as general practitioners had found was quite sufficient to guide them successfully in the management of the third stage of labour. This question of the management of the third stage of labour was one which interested them all deeply, because so many unforeseen accidents might arise if they were not very careful during the whole of the third stage. No one could be in practice as a general practitioner for twenty or thirty years, without being able to state dozens of cases where the life of the patient might have been lost if the hand of the accoucheur had not been placed on the fundus of the uterus. It was a simple matter managing the third stage of labour by the hand, if only they bore in mind what they had to do. What took place during the third stage? Never let them forget the great risk was hæmorrhage, and hæmorrhage began as soon as the uterus was trying to throw off the last part of the fœtus, namely, the placenta. One important point to bear in mind was this, the great factor in preventing hæmorrhage was clotting of blood. In addition to the clotting of blood, they had the obliteration of those cavities in which the cotyledons or lobules of the placenta were found in the uterine wall. In general language let them speak of these cavities as sinuses in the wall of the uterus, which were occupied before the child was born by a large part of the placental lobules, which were continually bathed in blood. Directly the uterus contracted after the expulsion of the child, they had a wonderful physiological fact. Immediately a tear took place between the placenta and the uterus, the blood began to clot. As long as there was no tear of tissue, as long as there was no injury to the living blood-vessels, clotting never took place in a living human uterus; but when the tissue was injured to the point of death, or torn, immediately the blood in the region began to clot, and that clotting of blood was the chief thing medical men must bear in mind when attending to the third stage of labour. The objections to the Crédé method were founded on the fact that it was apt to displace the clots of blood by too violent handling of the uterus when nature was somewhat slow in clotting the blood in these cavities. In addition to that, they had nature contracting and obliterating the cavities by muscular con-

traction, which, in addition to the clotting of blood, effectually closed all the cavities, so that the direct pressure of blood from the heart's force could not drive out the clots or open up the uterus. If that took place in every case there would be very little danger of hæmorrhage. But as they kept their hand on the fundus of the uterus it did occasionally swell up. He held it was altogether wrong to say that a uterine muscular fibre physically elongated itself by contraction. There was no such thing in the living body. As the result of studying the question with the deepest earnestness, he would say that the swelling up which they found when the hand was on the uterus after the expulsion of the placenta, was not from muscular contraction of the uterus. That was experimentally and physiologically false in the third stage of labour. He could prove that that swelling up of the uterus was nothing more or less than the result of pressure of the blood from the pumping of the heart, gradually filling up the cavities after they were partially closed by the clotting of blood. If they had patience, and kept their hand on the uterus to keep it down sufficiently, the clotting would go on till the whole of the sinuses were occupied by a large clot. After that it was a physiological impossibility for the uterus to swell up again. They did not get hæmorrhage when the uterus was swelling up, but when it was suddenly contracting after it was swollen. The hydrostatic force might be only so great as to distend the uterus, but not drive out the clots. The distension often acted so powerfully as a stimulant on the uterus that it sometimes went down in a moment and everything was driven out. There was not so much danger in that if the quantity expelled was not great. Now came the use of the hand to keep the uterus down sufficiently long and firmly till it contracted, and the clot had re-formed, and the uterus did not rise again. He was perfectly sure that a great deal of their mismanagement of the third stage of labour was due to the fact that they did not allow sufficient time for the uterus to contract thoroughly, and for the sinuses to be thoroughly occupied by a firm clot. Clotting of blood and contraction of the uterus were the sole means by which they could prevent that alarming thing, post-partum hæmor-

rhage. But as a practical man he pointed to one danger. In spite of the closing of the uterus and the occupying of the sinuses, they would have hæmorrhage if they did not watch and guard against great muscular efforts of the patient to rise while the binder was being put on. He was altogether in favour of the view that the uterus was always distended by the hydrostatic force of the blood coming from the heart. If the essential physiological action of the uterus was to keep up firm contraction, it was the most valuable thing an obstetrician had. He asked Professor Simpson if this keeping up a permanent contraction of the uterus by ergot could be depended upon.

Professor Simpson said, certainly,

Dr Haultain said it seemed to him that the management of the third stage of labour at the present time was debatable, not upon the question that Dr Foulis had brought before them, because Dr Hart's views he thought had been almost entirely disregarded, but upon the Dublin and Crédé methods of expulsion—that was to say, expulsion by artificial means of the placenta from the uterus by hand pressure, which they called the Crédé method; or by expressing the placenta from the vagina after it had left the uterus, which was the Dublin method. The essential difference between the two methods was so great that one required a clear understanding to know which was the method to adopt. In the first place, they might assume that in the majority of cases when a woman was placed deeply under chloroform during the second stage, the placenta would not be expelled from the vagina by natural means for two or three hours. From the point of view of a practitioner or any one else, to wait that length of time would be quite absurd. He should say the method they should adopt was, as Professor Simpson had said, to wait till the placenta had left the uterus, and proceed by various means to remove it from the vagina. In this connection he did not altogether agree with either Dr Ritchie or Dr MacVie in saying there was no time to be considered. They might not have a time limit, but they must have a time guide. If one wished to let people know what was considered a judicious time to wait for a normal case, he thought they must state what was a normal time for the third

stage. If they had not some time, they must fall back on their own personal ideas regarding it, which might be right or not. At any rate one had to teach others what time they considered they should wait. They found from a general average that half an hour was the normal time for the placenta to be expelled naturally from the uterus. If the placenta was not expelled in half an hour, he thought they might use a certain amount of rational artificial means to remove it from this situation. If that were so, then the question as to the means had to be considered. If they removed the placenta by force they used super-pubic pressure. Suppose by this means the placenta had reached the vagina, the next question was how to get it out of the vagina. He admitted that super-pubic pressure in most instances was sufficient to expel the placenta from the vagina, but there were frequently cases in which far too great super-pubic pressure was used. He had seen tremendous force used, and used futilely. He saw no objection to the introduction of the finger into the vagina to hook the placenta out. One of the essentials of the treatment of the third stage, there was strict attention to antiseptics. One point on which he did not agree with Professor Simpson was in regard to the effusion of blood between the placenta and the uterine wall. He thought that was a potent means of separation of the placenta. He did not think it was necessary to be so extremely officious as to keep the hand always over the uterus during the third stage of labour. If one felt the uterus contracting they might leave it alone, and feel at intervals if it were maintaining its retraction.

Dr Ballantyne supposed most of them had gone through the process in their practice of forming their own opinions as to the management of the third stage of labour after fully digesting those of their teachers. He had learned, perhaps somewhat slowly, but now with some amount of certainty, about the management of the third stage of labour—he did not say he had by any means reached finality, but he was nearer to it than formerly. He first gradually came to realise it was a *stage*, not simply a final point put, as it were, at the end of a sentence, and that therefore it needed the same sort of management as previous stages of labour, and had to be studied and treated accordingly. That idea very soon banished from his

practice anything that took the form of immediate expulsion or attempts at expulsion. In the second place, probably the next fact that came before him was that it was the *third* stage—that it was, so to say, not an unrelated condition of affairs, but a stage which succeeded upon previous stages of labour, and as a matter of fact to events long before them. That fact made him study his cases much more carefully than he had ever before been in the habit of doing; looking at them all round, learning what he could from them all, and treating accordingly. Dr MacVie had referred to a case of antenatal treatment of hæmophilia; but that was a very special case; at the same time one of the consequences they had tried to prevent was post-partum hæmorrhage. In previous confinements the hæmophilia woman had suffered from post-partum hæmorrhage, but under treatment with strychnine and chloride of calcium she escaped. That, however, was not an instance of third stage hæmorrhage; but the case which he now had in his mind was of that kind. It was under his care three years ago. It was that of a lady who had two confinements at Kimberley, and in each had very bad third stage hæmorrhage. She was there attended by two medical men. Her third baby was expected when she was in this country, and her medical man had written to him telling him of the character of the hæmorrhage, which was third stage, and was preceded by a certain amount of hydramnios. He had found when she was under his care there were certain signs of hydramnios. He put her on strychnine and iron. She came prematurely to labour at eight months, and although it was a long labour and she had hydramnios, and he had to apply the forceps, still in that case there was no third stage hæmorrhage; and it was a great comfort to see her able to go about within three weeks of labour, whereas on former occasions she had had a prolonged convalescence. He believed that the result was largely due to his having learned to pay attention to the former history of the case; and he had been aided by a knowledge of the failure of previous attempts at treatment. With regard to the actual management of the third stage of labour, the question seemed to be very much the difference between rule of thumb and a treatment thought out at the time. There was not the slightest doubt that a thought-out treatment at the

time was the correct thing, but those who were teachers could not expect their students to go into practice with the idea that they were to think out all their cases. They did not know the points to think out to the extent of doing so safely, so he was in the habit of saying to them, "Take my word for it in the meantime, and grasp the uterus if there is hæmorrhage; if there is no hæmorrhage keep the hand on the uterus, but do not necessarily grasp it, and be in an attitude for any hæmorrhagic emergency that may arise." He sometimes put it to them in the following way, to impress it upon their minds: "It is more important to grasp the mother's uterus than her hand before you leave your parturient patient." At the same time, there was the danger of leaving membranes behind, and that was not a small danger; so whilst chiefly striving to avoid hæmorrhage, they had to be careful to see that all the membranes as well as all the placenta had come away.

Dr MacVie explained that when he objected to a time allowance he did not mean to say that students should not be informed of the time which elapsed in the majority of cases between the expulsion of the child and the removal of the placenta. He objected to a student being told to wait twenty minutes before he interfered, whereas he might interfere at five or even not interfere at twenty minutes. The average case was never actually realised. It was like the typical animal of the naturalists, from which the actual animal differed in some degree. If they treated each case on an average, they were treating a case that did not happen. Every one who had been practising twenty years or so found that he must treat the actual circumstances as they arose, rather than follow any definite rules, especially in regard to time.

The President said that when this discussion was determined on he felt that it was one of great importance, more especially at the present time, when the practice of the profession in relation to the third stage of labour was being swayed by somewhat differing opinions as to its mechanism and conduct. He agreed with Dr Foulis that it was a pity Dr Berry Hart, having been detained by an unavoidable engagement, was unable to be present. For, though he did not think that Dr Hart had

convinced many by his views in regard to the separation of the placenta, still it was important that one of his authority should have an opportunity such as this of presenting to them his views as to the practical management of the third stage of labour based on his conception of its mechanism. He did not propose to occupy the Society for many minutes, but he wished to take this opportunity of emphasising one particular point. It seemed to him to be of paramount importance that those of them who were teachers of midwifery should realise the grave responsibility which lay on them of placing before their students clear and definite opinions as to the proper conduct of this process. This point had no doubt been raised, but not with the emphasis which he considered desirable. Now, were it not for certain possibilities, such as hæmorrhage, septicæmia, and some remoter contingencies which need not be specified, they might say that the sooner the third stage was finished the better. But for these contingencies, more especially the first two, they might, practically speaking, immediately the child was born, pass the hand into the uterus, detach and extract the placenta. But far less heroic methods of dealing with the placenta than this had been shown to be fraught with danger. Nothing was more important than that we should apply to the third stage of labour the same principles of management which are applied to the first and second. It was quite certain that the third stage of labour was a physiological process which required time for its accomplishment, and it was just as irrational to interfere with the third stage without due reason as it was to do so with the first or second. It was the disregard of this fact which had led in recent years to the abuse of the practice known as "Crédé's method," which in his opinion had been associated with many of the errors of practice as applied to this stage. Just as it was sometimes right and proper to use the forceps in the second stage, so it was occasionally good practice to employ Crédé's or some other method of finishing the third; but these cases are the exception. It seemed to him of the first importance, in reference to the management of this stage, that we should realise that the guiding principle in its conduct was constant watchfulness. This watchfulness could only be secured by the accoucheur

keeping his hand constantly over the fundus from the moment the child's head was born until the labour was completed by the delivery of the placenta and membranes. He felt convinced that if this practice was rigorously pursued, comparatively very few cases of post-partum hæmorrhage and very few complications of the third stage would occur. So important did he regard this procedure to be, that he made it a rule never, except under the gravest necessity, to remove his hand from the uterus during the time stated. Instead of tying the cord himself, which involves the use of both hands, he now clamped the cord with catch forceps and divided it with the right hand, all the time controlling the uterus with his left hand. So keenly did he regard his responsibility in this matter that he would not trust the best nurse he ever had with this duty. In this respect he was sorry to find that he differed in his teaching and practice from that of his friend Dr Haultain, whose somewhat cavalier treatment of this stage and his corresponding advice to his students he strongly deprecated. He did not for a moment admit that a retro-placental hæmorrhage was any part of the normal mechanism of labour, because if it was so it seemed to him impossible to explain the very large number of cases in which the placenta was born without any such hæmorrhage. It might be that fifty women might be safely delivered without the extreme watchfulness he had specified, but it was for the fifty-first for whom we must be prepared. In her case, the time during which the accoucheur was tying the cord when the uterus was left to itself might be the time when the uterine retraction failed, and during which it filled with blood, and in this way determined the moment when we are brought face to face with the terrors of a post-partum hæmorrhage. With the hand on the uterus, the first indications of such a condition could be recognised and dealt with on the instant. It was this unremitting watchfulness which seemed to him the key to the successful management of the third stage of labour.

Dr Simpson thanked the Fellows for the kind reception they had given to his paper, and said any criticisms that had been offered had been answered by subsequent speakers. It was to be hoped that some lives would be saved in consequence of their consideration of the subject that afternoon.

APPENDIX.

A CONTRIBUTION TO THE MORPHOLOGY OF THE HUMAN URINOGENITAL TRACT.

By D. Berry Hart, M.D., F.R.C.P. Edin., etc., *Lecturer on Midwifery and Diseases of Women, School of the Royal Colleges, Edinburgh, etc.*

Read before the Society on various occasions.

In two previous communications I discussed the questions of the origin of the hymen and vagina. I there attempted to show that the lower ends of the Wolffian ducts enter into the formation of the former, and that the latter was Müllerian in origin only in its upper two-thirds, the lower third being formed by blended urinogenital sinus and Wolffian ducts. In following this line of inquiry more deeply, it resolved itself into a much wider question—viz., the morphology of the human urinogenital tract, and this has occupied much of my spare time for the last five years. It soon became evident that what one required to investigate was really the early history and ultimate fate of the Wolffian body and its duct, as well as that of the Müllerian duct, and this led one back to the fundamental facts of development in relation to bladder and bowel. The result of this investigation will therefore be considered under the following heads:—

I. The Development of the Urinogenital Organs, Rectum, and External Genitals in the Human Fœtus up to the end of the First Month. The Development of the Permanent Kidney is not considered.

II. THE CONDITION OF THESE ORGANS AT THE 6TH TO 7TH WEEK.

III. THE CHANGES AT THE 14TH WEEK AND AT THE 24TH.

IV. THE STRUCTURE AND ORIGIN OF THE ADULT HUMAN VAGINA.

V. THE GENITAL TRACT IN THE MARSUPIALIA.

VI. THE ANALOGUES OF THE HUMAN MALE AND FEMALE GENITAL TRACT.

VII. THE RELATION OF THE VIEWS ADVANCED TO CERTAIN DEVELOPMENTAL ARRESTS.

VIII. ON THE NATURE AND DEVELOPMENT OF MUCOUS MEMBRANES.

IX. SUMMARY.

I have to explain that the greater part of the work was done in the Laboratory of the Royal College of Physicians, Edinburgh. Most of the microscopical specimens and of the microphotographs were made by Mr J. Hume Paterson, and those of the early chick by Mr Richard Muir. The incubation of the chick embryos was under the charge of my late assistant, Dr Allan Brough, and was carried out at the Laboratory of the Royal College of Physicians. Some of the work was carried out in my practical room, Surgeons' Hall. The clinical casts were made by myself on suitable cases prior to operation. To the Laboratory Committee, and to all the workers mentioned above, I have to express my great indebtedness.

I have also to state that the University of Edinburgh gave me a most generous grant from the Moray Fund towards the considerable expense involved in the work done, and also an additional grant for the plates of this paper, and I beg to tender my hearty thanks for their munificence.

I must now finally enumerate the material used in this investigation. It divides itself into (*a*) that of the human fœtus, and (*b*) the adult specimens and fœtuses of lower mammals.

(*a*) 1. Human embryos, 3 mm. and 4 mm. in serial sections.
2. Human embryo, serial sections, 28th day.

3. Pelvis of human embryo, serial sections, 6th and 7th week.
4. Pelves (central slabs) of human female fœtuses at 14th and 28th week, serial sections.
5. Male fœtuses at 8th week, 12th week, 14th week, and 18th week (central slabs, serial sections).
6. Prostate and adjacent parts in full-time male fœtus (serial sections).

These were the successful specimens. As all embryologists know in regard to early human fœtuses, the tissues are often not fresh enough for exact microscopical work, and I have had several disappointments in this way. It is a safe plan, therefore, not to cut and stain all the serial sections unless the early ones show the tissues to promise well.

(*b*) The genital tract in the adult rabbit, and especially in the rat-kangaroo, two specimens; Bennett's kangaroo, one specimen; Wallaby kangaroo, one specimen; pelvis of Bennett's kangaroo, one specimen, from Professor Symington of Belfast; many specimens of early pig and rabbit embryo were also cut in serial sections, as well as adult specimens of mole.

The specimens were thus numerous, several thousands of microscopical slides requiring careful examination.

I also examined a series of early chick embryos prepared by Mr Richard Muir.

In determining the scope of this examination, I was guided by the following criteria. In endeavouring to settle morphological questions as already defined, one should know—

1. The development of the urinogenital organs in the embryo.
2. The structure of these organs as modified in the female adult.
3. The structure of these organs as modified in the male adult.

These criteria I can fulfil with a fair amount of detail in the human fœtus and adult. In the other groups of mammals the work is necessarily only partial.

I. The Development of the Urinogenital Organs, Rectum, and External Genitals in the Human Fœtus up to the end of the First Month. The Development of the Permanent Kidney is not considered.

The development of the urinogenital organs is intimately bound up with the origin of, and further changes in, the primitive gut.

If we examine the sections of the caudal end of a 4 millimetre human embryo as figured by Keibel (fig. 1), we see the parts of the primitive gut known as the end-gut and the entodermal cloaca. Anteriorly the latter is bounded by what is known as the cloacal membrane, reaching from the body end of the future navel to the limit between entodermal cloaca and end-gut. This boundary has at first no mesoblast, is related in part to the primitive streak, *i.e.* is developed from its posterior end, and is probably due to a drawing out of the blastopore.

A few words may be added on this point so as to make the matter quite clear. In the development of the amphioxus we have first a cell proliferation which leads to the formation of a hollow sphere—the blastula (fig. 2). This invaginates and gives a double-layered structure (ectoderm and endoderm)—the gastrula—with an aperture of invagination—the blastopore (fig. 3). This gastrula stage is supposed to hold good for vertebrates in general (Haeckel and others).

In the germinal area of the rabbit we get an axial thickening of the ectoderm—the primitive streak—which develops lateral thickenings, and also an aperture at the anterior end, the neurenteric canal, which forms a communication between endoderm and ectoderm.

In the early human embryo (2 mm.), Graf Spee has found the *canalis neurentericus* which unites the endoderm of the umbilical vesicle with the ectoderm, and represents the blastopore of the gastrula stage (fig. 4). Keibel in his sections of embryo E. B. (caudal end; greatest length, 3 mm.), figures the cloacal membrane and remains of the primitive streak on it, so that it is probable that the cloacal membrane represents or is derived, in part at any rate, from the posterior end of the primitive streak, along with a drawing out and union of the

edges of the blastopore (which in itself lies in the anterior part of the streak), and this would explain the want of mesoblast at first. The cloacal membrane extends up as far as the root of the future navel and back to the front of the future anus, as one of the malformations I have to consider later on tends to demonstrate. The development of the cloacal membrane is of great interest, as its patency in the new-born fœtus gives rise to the rare condition known as extroversion of the bladder, and explains cases of split pelvis, split clitoris, etc., as I shall indicate further on (*v.* paper following, p. 305).

Before detailing the further changes, I wish to remark on the unsatisfactory nature of the nomenclature in relation to the primitive gut. The term "entodermal cloaca" is apt to be confused with the term cloaca, used legitimately enough at a later stage of development for the common inferior aperture in the 6 weeks' embryo or in the permanent organs of the ornithorhynchus. I beg to suggest that we might speak of the "end-gut" as the *pars ultima;* of the "entodermal cloaca" as the *pars penultima;* of the "cloacal membrane" as the *anterior gut membrane*, short for *anterior penultimate gut membrane.*

Into the so-called entodermal cloaca the Wolffian ducts open. These have their origin from the ectoderm, as has been shown for the guinea-pig by Graf Spee, and by Kollmann for the human embryo.

In an 8 millimetre fœtus (sagitta mesial section) further changes are shown by Keibel. The end-gut (pars ultima) (fig. 5) is in course of disappearance, while from the lower end of the Wolffian duct the ureter is taking its origin. The penultimate gut (entodermal cloaca) now becomes divided by coronal (side lateral) folds into an anterior and posterior part, the closure proceeding from above down; the posterior division forms the rectum ultimately; the anterior, part of the bladder and the urinogenital sinus (figs. 6-9). In the guinea-pig a peritoneal dip separates the upper parts of these organs (Keibel).

In the guinea-pig, where the allantois is very transitory, and at any rate where no entodermal allantois is present at the time the bladder develops, the urinary viscus arises, according to Keibel, from the anterior division of the penultimate gut. In

the human embryo the stalk of the allantois is usually described as giving origin to the bladder; but we must remember that in the human embryo the allantois is quite rudimentary, and that it seems more exact to describe the bladder as also originating in the human embryo from the front division of the penultimate gut (entodermal cloaca) with probably only its upper part allantoic. The folds so dividing off the primitive gut are coronal, as Keibel's sections show. He also points out that the epithelial lining of the two divisions so formed is different, prior to division, that of the future rectum being more columnar (figs. 6 and 7).

This view of the origin of the bladder, which we owe to Rathke, Lieberkühn, and Keibel, is a very valuable one, and explains completely the normal anatomy and the various malformations connected with the bladder and rectum. Keibel's 8 mm. section (fig. 5) shows the ureter budding off from the Wolffian duct and developing from below up, and it may be asked how the ureter and the Wolffian duct become separated at their lower ends. They do so by the development of the trigone of the bladder, and thus the ureteric openings come to lie above those of the vasa deferentia in the male, or that of the hymen in the female.

II. The Condition of these Organs at the 6th to 7th Week.

For this stage I have a perfectly preserved 6 to 7 weeks' fœtus, obtained by extirpation of a pregnant uterus which was also cancerous. Of the pelvis of this fœtus I have several serial transverse sections by Dr Lovell Gulland, while for a mesial section of a somewhat later date I take that published by Keibel (8th week).

In the transverse sections of my specimen, 48 in number, the following conditions exist:—

1. A cloaca—ectodermal cloaca—is present (sects. 38-44).
2. The urinogenital sinus is present, and has the Wolffian duct openings in it (sect. 31), with the eminence of Müller in the section above (sect. 30) (figs. 11, 12 and 13).
3. The genital cord has formed (sects. 25-32) with three

canals in it, the central one being the coalesced Müllerian ducts; the two lateral ones the Wolffian ducts (fig. 12).

4. The broad ligaments with Müllerian ducts and ovary are present (sects. 10-23).
5. The Wolffian bodies are present with the Wolffian ducts (sects. 10-22), and in a state of retrogression (fig. 15).
6. The permanent kidney[1] is developed (sect. 18 and upwards) (fig. 14).
7. The ureter is present, but no connection with the bladder can be traced.

These sections show well that the processes which bring about the complete urinogenital sinus, bladder, etc., are due to development from above and below, as in sections 34-37 we have no connection between urinogenital sinus above and the part being formed from below. We have at this stage a real cloacal arrangement, the urinogenital sinus and bowel opening into a large undivided space—the cloaca. How has this arisen? So far as I know, the intermediate stage has not been found in the human embryo, but from what Retterer has figured in the rabbit embryo (figs. 16 and 17), we may have an epithelial ectodermic plug formed, pyramidal in section, with its apex towards the lower portion of the urinogenital sinus to meet the coronal partition of the primitive gut, and by the breaking down of this centrally we get the condition of the 6 to 7 weeks' fœtus produced (fig. 18).

We have now to consider how the permanent condition of the pelvic organs in the adult is brought about. How is the perineum formed? This we now take up.

The course of the changes described here is known in part from human embryos, aided by a knowledge of what takes place in the embryos of lower mammals, and also by a consideration of certain rare malformations in the adult female, due to defective cloacal changes. On this subject the most valuable papers are Rathke, Reichel, Von Rosthorn, Keibel, Tourneux, and Retterer. Reichel in his paper describes a case of a patient, 25 years of age, who was admitted to the Klinik complaining of incontinence of fæces. Prior to her

[1] By a mistake in my early paper, this was lettered as Wolffian body.

marriage, three years before, her condition in regard to this had been normal. On examination, anus, labia minora and majora were found normal, but a fistula ran between the rectum and the fossa navicularis, the external opening being below the hymen. The perineum was short, and badly developed. The fistula was undoubtedly due to coitus. Von Rosthorn and Caradec relate similar cases. In Von Rosthorn's case the lower end of the fistula admitted two fingers.

Reichel gives a good account of the development bearing on this particular point. He confirms Rathke's description, in 1830, as to the closing of the cloacal opening. This happens as follows:—

From a mesial skin-fold the genital eminence develops, giving rise to clitoris and penis. From two lateral folds below it, we get the labia with the genital furrow between, the cloacal pit lying posteriorly. Two eminences develop at the side of the cloaca, and by their junction in the middle line, and union with the septum dividing bladder from rectum, above, we get the perineum formed, and *the cloaca with its bowel opening obliterated.* In the cases narrated by Reichel and Von Rosthorn the cloaca has remained in part, but the bowel opening has become closed at the apex of the cloacal pit. Marital relations had caused a breaking down of the tissue between bowel and the rest of the cloaca, and thus an incontinence of fæces was established.

The permanent anus is not developed from the bowel opening into the cloaca. This closes, as has been described, and the permanent anus develops as follows:—

The development of the anus is well seen at the stages between the second and third and a half month, and we also get a very clear view of how the epidermis, by passing in deeply, forms a lumen. The sagittal sections show the epidermis passing in as a series of tubular ingrowths (fig. 19). When at the top of the anal orifice, the superficial cells cease, and the deep cells pass up in two layers to meet the epithelium of the Lieberkühnian glands. The anus is thus formed like the prepuce—viz., *the epidermis, deep layer and superficial layers, passes in; the superficial cells (now central) desquamate, and thus the lumen forms.*

I may finally, under this division, briefly consider the

question of the production of the cavities or spaces already alluded to. I have mentioned the formation of the primitive gut, the division of the entodermal cloaca into bladder and rectum, and, finally, the formation of the ectodermal cloaca at the 6th week. Each of these shows a different mechanism.

1. *The primitive gut is formed by the ventral infolding of the early embryonic area—i.e.*, by head, tail, and lateral folds converging centrally to the site of the future navel.

2. *The bladder with the urinogenital sinus and the rectum are formed by mesoblastic folds which pass partly from above and partly from the sides.* They are thus partition folds, and there is no central breaking down.

3. *The cloaca—ectodermal cloaca, it may be termed—is formed in all probability in a way much used in the developing embryo*, as we have seen in the development of the anus, and shall see when we take up the development of the prepuce and vagina. The active ectoderm by proliferation forms a plug, cylindrical or pyramidal, the deeper active cells forming the outer surface except at the free base, the centre of the plug or cylinder being made up of cells less active and tending to be shed. Thus, after a plug has formed, the centre breaks down, and a cavity or slit forms. This is cavity—or slit—formation by ectodermic action, and is sharply contrasted with the method of formation of cavities by splanchnopleuric folds where no breaking down happens. As a broad fact, therefore, the ectoderm forms orifices or open slits, by the breaking down of a solid plug; the mesoderm, cavities or lumina by partitions (figs. 6-9 and 10, 11, 18 and 19).

III. The Changes at the 14th Week and at the 24th.

The changes that take place at or about the 14th week are of very great importance and of the highest interest. We undoubtedly need graduated specimens filling up the stages between the 8th and 14th week, but even with these gaps not yet made good, the changes at the 14th week are of a very evident and pronounced nature. Thus, on viewing a mesial section of a female fœtus at the 14th week, and comparing it with that at the 7th week, we see that the cloacal condition has disappeared, the urinogenital sinus has shortened, the

hymen is in process of formation, the relations of urethra and vagina are more like those of the adult condition, a permanent anus is in course of formation, and the prepuce of the clitoris is being developed.

The mechanism of the formation of the rectum and bladder, of their external openings and the formation of the permanent anus, have already been given, and need not be discussed. We must take up, however:

1. *The formation of the preputium clitoridis.*
2. *The development of the hymen, and the changes in the vagina and uterus.*
3. *The formation of the female and male urethra, and the changes in the urethral orifice.*

1. *The formation of the preputium clitoridis.*—In the early stages, prior to the 3rd month, the genital eminence is covered by an unbroken layer of epidermis, and sections show no attempt at preputial formation. If, however, sections be examined between the 3rd and 5th months, a remarkable condition is found. In sagittal mesial section (fig. 20) one sees the glans formed and bounded by cells continuous with the deep layer of the epidermis. The preputial aperture has formed, but is filled with a solid plug of cells, while between the glans surface and the inner surface of the prepuce we have also a solid layer. This is often represented, but most erroneously, as a fusion of the epithelial surfaces of the glans and prepuce. In coronal section one sees a remarkable horse-shoe arrangement, the outline of the horse-shoe being mapped out by deeply-stained cells, whilst between these we have less deeply-stained cells. In certain lateral sections, again, we get an analogous arrangement, but a circular one.

These appearances show that the prepuce is developed as follows:—At the apex of the glans the epidermis passes in following the glans outline.[1] The active epidermic cells, more deeply stained, rest on the glans and the inner preputial surface; between these lie the less deeply-stained cells, corresponding to the more superficial cells of the epidermis. We see here,

[1] I have sections to show that the glans is formed first in the male, at any rate.

then, very well illustrated, how the epidermis forms lumina. In the epidermis at this stage we have an active deep layer, and above it the less active cells with a tendency to desquamate. When the epidermis has passed in as described, the central cells in the horse-shoe arrangement, for instance, desquamate, and we then get the movable prepuce in the child. The prepuce is thus formed by *the epidermis passing in round the glans, with its active cells deep, its less active and desquamating ones central; the desquamation of the latter makes the mobile prepuce.*

It is usually said that the prepuce grows forwards from the glans root, that the inner surface adheres to the glans and then breaks down. This is quite an erroneous description, and leads to serious pathological errors in surgery. Adherent prepuce is not an adhesion really, but a hindered central desquamation.

In one specimen I found the cells passed in not yet desquamated; but it was interesting to note that the central cells were flatter than the others. The glans clitoridis is imperforate in the human female.

2. *The development of the hymen, and the changes in the vagina and uterus.*—We now take up one of the most interesting points in this investigation, as the results under this heading are opposed to current views, and appear to me to clear up several hitherto obscure points.

These changes occur at the 14th week, and have hitherto been described as a metamorphosis of the lining of the part of the Müllerian ducts forming the anlage of the vagina. The lower end of the fused ducts, especially, is said to become distended, owing to epithelial proliferation. This proliferation causes perforation into the urinogenital sinus, thus forming the hymen.

Klein says: "Der Hymen ist jener Theil des Beckenbodens welcher durch den spätestens im Anfang des drittens Monats erfolgenden Durchbruch des Müllerschen Gänges und durch die vom dritten bis fünften fötal Monat erfolgenden ampulläre Erweiterung des Endtheiles der Vagina abgegrenzt und verdünnt wurde." Nagel's (p. 100) description is as follows: "Bei Embryonen aus dem 3 Monat beginnt eine Vermehrung und Anhäufung der oberen Schichten des Epithels, welche zuerst dicht oberhalb des Orificium vaginae auftritt, wodurch die Vagina an dieser Stelle (bei Embryonen von 7-10 cm.

Rumpflange) eine bauchige Erweiterung erfährt. Durch diese Erweiterung ensteht der Hymen."

Tourneux and Legay state: "Au commencement du 4° mois lunaire, chez le fœtus humain (7·5-10·5) la portion inférieure ou vaginale du canal génital (moitié environ) est tapissée par un epithelium pavementeux stratifié qui se continue par une transition graduelle avec l'epithelium de la portion supérieure ou utérine."

In a very well-preserved female fœtus of the third and a half month which I examined by serial sections, using the paraffin method and staining with logwood and eosin, I found a series of conditions which threw quite a novel light on the development of the hymen. I found that at the site of the hymen two epithelial bulbs developed. These measured in the specimen shown at fig. 21, ·3 mm. × ·2 mm.; as they near the middle line they are larger, and they measure as much as ·5 mm. × ·4 mm. — *i.e.* may be double the former size. They lie, in the main, lateral to one another, are composed of epithelial cells exactly like those of the adult vagina, and have their structure and relations well shown in fig. 21. The origin of these bulbs of epithelium had now to be settled, and, on examining the sections carefully, I at last came on the Wolffian duct ending in the smaller one (fig. 21). This enabled me to clear up the matter; as evidently these bulbs, which I now term the "Wolffian bulbs," are derived from the Wolffian ducts, and as these, according to all recent embryological work, are derived from the ectoderm, this layer is the source of the epithelium of the bulbs. The sections of this fœtus further showed that the epithelial cells of these proliferated into the Müllerian vagina, mapped out the fornices, and passed into the lower third of the cervical canal, blocking these up and rendering them solid for a time, as Tourneux and Legay have well figured.

The central cells, which, both in the Wolffian bulbs and in the Müllerian vagina, are the more advanced, soon begin to desquamate, and in this way a central lumen forms. The view advanced, however, by such able observers as Nagel, Klein, and Tourneux and Legay, requires careful consideration. Their view is that the vaginal epithelium is the result of a transformation of the original Müllerian lining, while I urge that we

have an actual eruption of cells from the Wolffian bulbs into the Müllerian vagina: that indeed the mechanism is like what I have described in the development of the prepuce and anus. I would urge that the mere transformation of cells would not necessarily involve the coalescence that renders the vagina and its fornices at first solid, while the explanation I have given does.

In order, however, to establish the opening of the hymen, an active involution of epithelial cells in the urinogenital sinus takes place, and thus by the distending bulbs above, and the epithelial involution from below, the entrance of the vagina—*i.e.* the hymeneal orifice—is formed. *Thus the hymen is formed by a special bulbous development of the lower ends of the two Wolffian ducts aided by an epithelial involution from below of the cells lining the urinogenital sinus* (fig. 20).

The hymen bilamellatus described by Shaeffer at the 5th month is probably due to the persistence of the upper and lower margins or edges of the bulbs, and disappears in the more advanced fœtus. Shaeffer's statement is: "Jeder Hymen wird mehr oder weniger deutlich in 5 Monate als bilamelletus angelegt." I have not, however, as yet had an opportunity of examining this transitional form.

The whole of the developmental changes might be summed up now as follows:—Formation of primitive gut, seen in embryos of 20th-23rd day (fig. 1); division of primitive gut into bladder (with urinogenital sinus) and rectum, and withering of end-gut about 20th-30th day (fig. 5); communication of bladder and rectum with exterior (formation of cloaca) by breaking down of hypothetical plug (in human species) before 6th week (figs. 16, 17, 18); closure of cloaca by Reichel's Analhöcker and formation of perineum, 7th-8th week; urinogenital sinus with Müllerian ducts related to it and Wolffian ducts opening into it, no anus, at 8th-9th week; hymen formed, anus formed, preputium clitoridis in course of formation, Müllerian vagina being relined, and uterus now single; 3rd to 4th month (figs. 20, 21).

These periods are only approximate. An excellent table is given by Wendeler, and Nagel's papers should be consulted for his views as to the formation of the perineum.

IV. The Structure and Origin of the Adult Vagina.

So far as the structure of the vagina in the adult is concerned, I wish to direct attention only to two points—viz.,

(*a*) *The relations of the normal hymen.*
(*b*) *The naked-eye arrangement of the vaginal rugæ and columns.*

I shall then discuss the anlage, or fundamental origin of the vagina.

(*a*) *The relations of the normal hymen.*—If a normally-developed *virgo intacta* be examined carefully while under chloroform and in the lithotomy posture, as one has often an opportunity of doing in operative cases—*e.g.* in dilatation for dysmenorrhœa—and if care be taken not to disturb the parts unduly, it can be easily noted that the so-called hymeneal entrance is a vertical slit, and that the edges of the slit are in contact (Cullingworth). This can be well seen in the sections of the 4 months' fœtus, where we can observe the vertical slit in the centre of the epithelial proliferation of the hymen (fig. 22).

How this arises is easily understood when we consider what has been already stated as to the development of the hymen. The vertical slit is due to the coalescence and central breaking down of the laterally placed Wolffian bulbs, and the so-called crescentic hymen as well as the oval form are made by the examining fingers separating the vertical edges.

(*b*) *The naked-eye arrangement of the vaginal rugæ and columns.*—On examining the vagina in adults, preferably in a multiparous married woman, one notices a distinct difference in the upper and lower straits. The lowest inch of the vagina is narrowed and has rugæ or columns, in the main running longitudinally. Above this the vagina is transversely wider and has its rugæ transverse. This difference to the naked eye is very striking, and has not hitherto been sufficiently noted. The anterior and posterior columns I consider not as septal remains of the Müllerian portion of the vagina, but as the remains of the original partition between the Wolffian bulbs.

While, then, the hymen is derived from the Wolffian bulbs,

as I have indicated, it may be asked what evidence there is as to the extent of the participation in vaginal formation of the urinogenital sinus. As we have already seen, the Müllerian ducts in the early fœtus end in the eminence of Müller; the Wolffian ducts open below them. It follows, therefore, from what has gone before, that the upper portion of the urinogenital sinus enters into the formation of the vagina, and that the lower end of the vagina is due to a blending of Wolffian ducts and urinogenital sinus. This lower portion measures, in the adult, about an inch. I base this estimate on the different naked-eye structure of this part of the vagina, what may be termed its columnar portion, and on the fact that in certain rare forms of atresia classed with atresia hymenalis, a transverse septum is found an inch from the actual hymen (*v.* also p. 295).

In the two-months' fœtus the urinogenital sinus is relatively long, has the Wolffian ducts at its upper part, and the bulbs developing from them block it therefore, and probably block the lower portion of the urethra too. The involution from below perforates both obstructions, and this view explains, I believe, the apparent urethral hymen seen so often. The urinogenital sinus of the early fœtus is therefore represented in the adult by the vestibule, lower portion of the urethra, and lower third of vagina.

In the adult human vagina the anlage is therefore as follows:—

(1). The upper two-thirds of the vagina are derived from the ducts of Müller.

(2). The lower third is due to the coalescence of the upper portion of the urinogenital sinus, and the lower ends of the Wolffian ducts.

(3). The epithelial lining of the vagina is derived from the Wolffian bulbs, which again are epithelial proliferations of the lower ends of the Wolffian ducts. The vaginal mucous membrane is thus epiblastic.

The outline of the human vagina from a developmental point of view is indicated in fig. 23.

The Relation of the Origin of the Vagina to its Lymphatic Supply.

I take this part, as it affords a very interesting comment on the view I have advanced.

As is well known, the lymphatics of the external genitals, and lower third of the vagina and urethra pour into the inguinal glands—*i.e.*, these receive the lymphatics of the genital tract, whose anlage is the urinogenital sinus, while the lymphatics of the upper two-thirds or Müllerian portion of the vagina join with those of the cervix uteri to enter the hypogastric glands.

How far the vascular and nervous supply of the pelvis is moulded on this central fact I have not yet had time to determine exactly, but it might be considered in the case of some of the lower animals first—*e.g.*, in the dog. I may point out, however, that the pudic artery and nerve supply the lower end of the genital tract and external genitals, but the exact upper boundary of this supply I have not had time to look into. It is probable, however, that the urinogenital and rectal tract may be divided into two great parts—an upper and lower. The latter comprises external genitals, lower end of urethra, lower third of vagina and anus: the former, the rest of urethra, the bladder, upper two-thirds of vagina, uterus and tube, and rectum. Hermann records a remarkable case where from nerve or vascular influence this lower part alone seems to have sloughed. Von Lingen has also drawn attention to a number of cases where a cast of the upper part of the vagina and vaginal portions of the cervix, comprising mucous membrane, submucous and some muscular fibre, has sloughed off. He points out that this part is supplied by the cervico-vaginal branch of the uterine artery, and one supposes that thrombosis of this branch must have occurred. These pathological cases form an interesting comment on the view I have given.

3. *The formation of the female and male urethra and the changes at the urethral orifice.*—In the female the urethra is developed from the lower end of the anterior division of the primitive gut. It is possible, as I have already suggested, that

during the formation of the hymen the urinogenital sinus becomes blocked, and the urethra at its lower end perforated from below again (*v.* p. 273).

The male urethra is formed from the primitive gut in the same way down as far as the colliculis seminalis, the hymeneal analogue. Below this, where the adult female is, as it were, hypospadic, the male urethra is closed. As, however, this same hypospadias exists in the embryo in both sexes, the question arises as to how the male urethra becomes ultimately closed on its inferior aspect. The usual statement is that the parts analogous to the labia minora in the female unite by their edges and thus close in the canal. Of this method of closure there is only a fair amount of proof, and it does not explain how the male glans becomes perforated.

Three of my specimens were available for studying this question. The first was a male fœtus between the 2nd and 3rd months; the second, a male at the third and a half month; and the third, one at the 4th month.

In the first and second the closure was going on, but there was no perforation of the glans; in the third, the perforation of the glans was going on (figs. 24, 25, and 26). In regard to the closure of the inferior aspect of the spongy portion of the urethra, it can be noted that the greater part of the posterior closure was due to a gradual growth forwards of epidermis and deeper tissue towards the frænum, and probably forming a solid closure. Behind the frænum the deep and superficial layers of the epidermis passed in and back, the superficial cells being central and tunnelling back to meet the higher part of the urethra. These appearances are illustrated by figs. 24, 25, and 26. The posterior part of the urethra thus seemed to be closed as usually described, but certainly tunnelling goes on from before backwards, the active epidermis passing in and back, and by central desquamation forming a lumen. The changes closing in the posterior part are more difficult to follow, but those in front are certain.

Sections at the fourth and a half month show the prepuce in course of formation, as I have already described. There is, however, a remarkable condition to be noted at the apex of the glans, where the epidermis passes in as a solid plug to cause

perforation of the glans there and to meet the canal behind (fig. 26).

Thus, in the male urethra the canal is formed down to the perineum by the urinogenital sinus; below this we get the canal completed by a gradual and apparently solid closure of the ridges from behind forwards. Immediately posterior to the frænum the epidermis passes in and back, making a lumen, as already described; finally, the glans is perforated by an epidermal plug, and thus the continuous canal formed.

Further observation is, however, needed on these points, which are subsidiary to the present inquiry.

V. The Genital Tract in the Marsupialia.

I have examined the genital tract in seven specimens. Two of these were what is termed the Rat kangaroo (*Hypsiprymnus*), two were Wallaby kangaroos, and three were specimens of Bennett's kangaroo (*Macropus Benneti*). I am indebted to the Marquis of Bute for the Wallaby kangaroos, to Professor Symington for the pelvis of one of the Bennett's kangaroos, and to Professor Kelly of Baltimore for one of the opossum. The rat kangaroos were obtained alive, and I was thus enabled to get the genital tract fresh and in good condition for microscopical examination. In one I therefore had serial sections made of the whole genital tract, so that the complicated structures might be traced accurately. This involved the preparation of about two thousand slides on this question alone. The other specimens were examined for their naked-eye relations, and drawings made.

I purpose, therefore, under this heading to consider—

1. *The naked-eye anatomy of the Kangaroo genital tract.*
2. *The microscopical serial sectional anatomy of the genital tract in the Rat Kangaroo.*

1. *The naked-eye anatomy of the Kangaroo genital tract.*— In the *Marsupials* we have a very remarkable arrangement in the vaginal portion of the genital tract. The uterus is bicornuous, and each horn has its lower opening or os uteri. The vagina has two lateral canals, which may arch and meet above, this portion lying between bladder and uterus like a

second bladder. Below, these so-called lateral canals open into the urinogenital sinus. In addition, a median portion is present, and this communicates above with the lateral canals, while below it may end as a *cul-de-sac*, or in some species open into the urinogenital sinus. In the central portion, the double os uteri opens. Lister and Fletcher discuss the condition of the median portion in the Macropodidæ carefully, and give a table of the various species, and the arrangements in each as to this point. Some allege that the opening is not present in the same animal in its early life. Figs. 27, 28, and 29 give the variations, so far as known, in the different species of marsupials. These authors also figure the relations of the Wolffian ducts and ducts of Müller in an embryo of *Macropus rufus*, and remark that the arrangement of the Müllerian ducts is the same as in the adult opossum.

In my own specimens (fig. 27) the naked-eye arrangement of the organs in one of the rat kangaroos (*Hypsiprymnus*) is shown. The following are the measurements:—

Length of genital tract from ovary to lower end of bowel, 7 cm.
Length of cornua, 7 mm.
Diameter of central canal, 5 mm.
Diameter of lateral canal, 3·5 mm.

In the opossum (*Didelphys dorsigera*) we have a double uterus, two lateral canals, a lower unpaired portion into which the former opens, then the urinogenital sinus.

In Macropus, figured by Owen, we have two lateral canals: a central blind pouch, with double cornua and ovaries.

A very important point is the relation of the ureters. These pass inside the lateral canals, and lie outside the median pouch when this is present (fig. 29). In the opossum (*Didelphys dorsigera*), the central portion of the tract is not well-marked, and may be only represented by the upper part of the lateral canals where the os uteri of each side opens, or by the lower mesial portion above the urinogenital sinus. In this opossum the ureters lie to the inside of the lateral canals.

The opinions hitherto expressed on these remarkable structures making up the vaginal segment of the genital tract in

marsupials have all been to the effect that the lateral canals as well as the central part are Müllerian.

Tourneux and Legay say: "Chez les marsupiaux, la non fusion des conduits de Müller (*Didelphys dorsigera*) est la consequence d'une disposition spéciale des urétères, qui, au lieu d'embrasser dans leur courbure le cordon génital s'engagent dans l'epaisseur même de ce cordon, entre les conduits de Müller qu'ils separent" (*op. cit.*, p. 376).

Brass says: "Wir . . . . von einer dreifachen Vagina sprechen können" (p. 36).

The conclusion I have come to in regard to the morphology of the vaginal tract in the marsupials is that the lateral canals represent the Wolffian ducts, and that the mesial *cul-de-sac* is Müllerian. The evidence for this is as follows:—

Naked eye.—That the central portion is Müllerian is quite evident. It has the os uteri of each horn at its upper part; Owen further figures the remains of a septum in the mesial portion. The lateral canals occupy the position of the persistent Wolffian ducts, have the ureter on their inner aspect, and open below into the urinogenital sinus.

The permanent arrangement in the marsupials is what we find in the human embryo at or about the 6th to 7th week of intra-uterine life. We have, therefore, in the marsupials the primitive developmental condition of the urinogenital ducts remaining, instead of coalescing, as in the higher mammals; the Müllerian element may be less evident, as in the opossum, or both elements may be well represented, as in the Macropodidæ.

As to the function of the lateral canals, it has been ascertained that the seminal fluid is transmitted by them, and that the fœtus in certain cases passes along them (Hill). According to some authors the fœtus passes by the central portion even when this does not open into the urinogenital sinus, and Hill records a case where the fœtus did not pass by the lateral canals but into the connective tissue between them, the central pouch being absent.

Microscopical.—The microscopical structure varies in the case of the central and lateral canals, the former being lined with a single layer of columnar epithelium, like that of the human

cervix uteri, while the latter are lined with many layers of squamous epithelium. This, however, is considered more fully presently.

An important point is the relation of the ureter to the vagina in the adult female mammal, as well as that of the ureter to the urinogenital ducts in the mammalian fœtus. With the present tendency of biological thought, one would expect these relations to be on a common plan. In the kangaroo adult the ureters pass inside the lateral canal and outside the central vaginal canal before entering the bladder. Their relations are well seen at fig. 27. There one can note the ureters passing down from the kidney to run behind the cornua, and, at a lower level, to penetrate the bladder wall after passing inside the lateral canals; the central vaginal canal lies between them.

Lister and Fletcher figure a diagram of an early fœtus of *Macropus rufus*, and state that the ureters pass outside both Müllerian and Wolffian ducts, an arrangement, they say, like that of the adult didelphys. There must be some error here, as whatever view one takes of the origin of the vaginal canals in the opossum, the ureters pass to the inner side of the lateral canals.

The question of these relations has now to be raised in regard to the human fœtus. Here we get opinions at variance with what I find in the specimens I have examined. Nagel says: "The ureters lie to the outside of the Wolffian ducts" (in fœtus of 8 mm.).

In an embryo figured by Keibel from His' collection (embryo L.O. 25 mm., female, 8½-9 weeks), Keibel states that the ureters lie lateral, the Wolffian and Müllerian ducts mesial. A section of this is figured, and also serial sections to illustrate the relation (figs. 90-100, Keibel). An examination of these (Keibel, pp. 100 and 103) seems to me to bear a different interpretation. Fortunately, the fœtus of which I figure transverse sections is about the same age and size as L.O., and is practically the same in structure.

From the study of these and a third specimen, which I owe to the kindness of Mr Stiles, the following seems to me a more correct view:

(1) At the genital cord, where in the human fœtus the Wolffian ducts are placed together, with the blended and there-

fore now single Müllerian ducts between, *we get the ureters lateral.* One cannot compare the fœtus at this level with the adult kangaroo type, as the canals are too approximated.

(2) Higher up in the fœtus we get the following relations—viz., to the outside, the Wolffian duct; somewhat internal to this the Müllerian duct, and much further towards the middle line the ureters (*v.* fig. 90 of Keibel). As one passes down the sections the Wolffian and Müllerian ducts lie closer together, and the ureters are thrown to the outside. The bladder is high, however, in the kangaroo—*i.e.*, lies in front of the cornua; in the human female it is deeper; the ureters, therefore, enter the kangaroo bladder higher up.

This is manifestly the level (*v.* sheet and fig. 90, Keibel) one must compare with the kangaroo and human fœtal tracts, as here the ducts are separated and not approximated.

We have thus at a certain stage of the development of the human fœtus, and at a certain level of the fœtus, an arrangement of the ureters and urinogenital ducts analogous to what one would expect in the kangaroo if the lateral vaginal canals be really Wolffian and the central Müllerian.

This question, however, requires further working out.

2. *The microscopical serial sectional anatomy of the genital tract in the Rat Kangaroo.*—The structure and relations of the parts were very well brought out in one of the specimens by means of serial sections of the entire tract. These were cut with the Cambridge rocking microtome and stained in the usual manner with logwood and eosin. The organs examined were the ovary, tube, cornu, lateral canals, central portion of vagina, urethra, bladder, ureter and intervening tissue, the rectum and anal glands.

The *Ovary.*—This measured 5 mm., and was set in the pavilion of the tube, like an egg in a cup. Its connective tissue was continuous with that of an attached fimbria.

The following structures make up the ovary, and need no comment. The germ epithelium is well marked over the outer surface, except where the tube was attached. Graafian follicles were present in abundance, and with the ordinary mammalian constituents of tunicæ fibrosa et propria, membrana granulosa with yelk and ovum. One peculiar feature in the ovary was at

the hilum, where, amid a group of endotheliomatous cells, a canalicular system lined with epithelial cells was present where the tube grasped the ovary (fig. 35). Careful study of the serial sections seemed to me to show that this was continuous with the epoöphoron, and was thus the paroöphoron.

The ovary in this animal thus varies from the human ovum in two remarkable points, viz.:—

(1). The paroöphoron ends in the centre of the ovary near the hilum.

(2). The ovary is inserted in part into the pavilion of the tube, like an egg in a cup.

It is interesting, therefore, to note that the early indifferent sexual gland had become an ovary, but had retained a large part of what would become the vas deferens in a male specimen.

The *tube* calls for little remark, as it resembles in many points that of the human tuba Fallopii. It has a mucous membrane consisting of columnar epithelium on a basis of connective tissue and thrown into folds, especially in its outer part. Circular and longitudinal unstriped muscular fibres form the wall, which is covered externally with peritoneum. The cornu has a very well-formed and thick mucous membrane with many glands (fig. 30). The interglandular connective tissue consists of a homogeneous basis and connective tissue corpuscles. The epithelium lining the glands is well formed and columnar, with large nuclei and nucleoli. In the lower part or cervix the epithelium is columnar and narrow like the cervical epithelium of the human uterus. The muscular wall is thinner than that of the mucous membrane, and has longitudinal (outer) and circular muscular fibres, with some interlacing ones. The interglandular connective tissue passes into the wall, and thus vessels enter the mucous membrane from it. Near the tube and ovary the epoöphoron is seen well developed, and consists on section of many tubules lined with epithelium of a columnar but somewhat flattened type.

The *central vaginal portion* is lined with narrow columnar epithelium like that of the cervix, while that of *the lateral canals* is squamous and many-layered. This is well seen on T.S. (fig. 31), when one can further note that the muscular wall of

the lateral canals is much thicker than that of the central Müllerian (three to four times). *A common muscular coat surrounds the lateral and central portions.* The urethra is seen cut in front in this T.S., and the blood-vessels lie at the posterior angle of junction of the central and lateral portions.

The bladder, ureter, rectum and anal glands present no novel features.

So far as the microscopical anatomy goes, the cell structure is not rudimentary, but like that of higher mammals.

VI. The Analogues in the Male and Female Genital Tract.

While it is generally believed that the analogy between the male and female genital tract is a very close one, the exact details have by no means been worked out, and excellent observers are at variance on several points.

Exact analogues have yet to be determined in regard to those organs which are rudimentary in the one sex and fully developed in the other. That it is as yet disputed how far the vas deferens of the male is represented in the female; how much of the vagina is represented in the male, and so on. This practically means that we must consider not only the adult anatomy of the genital organs, but also their development, and this resolves itself, in the main, into a consideration of the development of the urinogenital organs. I shall therefore consider the subject as follows:—

A. *The development, immediate and ultimate, of the urinogenital organs, so far as known, in man.*
B. *The significance of the temporary development of the Wolffian bodies in the human embryo.*
C. *The ultimate fate of the urinogenital organs in the male and female; the male and female analogues.*
D. *The homology of the male and female sexual function.*

A.—*The development, immediate and ultimate, of the urinogenital organs, so far as is known, in man.*

The development of the rectum, bladder, and urethra has

been considered in a previous section (pp. 262-264), and we have therefore only now to take up the development of the Wolffian bodies and ducts, and of the Müllerian ducts in the early stages. On this part of our subject there is a very large amount written, and what I give here is based on this and on my specimens at the 4th and 6th week. These were examined by serial sections.

If we take a 5 weeks' embryo, as Coste so beautifully figures, we find that in the pleuro-peritoneal cavity the temporary organs known as the Wolffian bodies have developed. They occupy the greater part of the length of this cavity, reaching from the heart downwards and backwards, to the caudal extremity. As is well known, we have, in the lower vertebrates, these bodies consisting of two parts—the pronephros or head kidney, and mesonephros or Wolffian body proper. In the human embryo it is disputed as to whether the pronephros is really represented. In my specimen of a month old I found at the top of the Wolffian body a pit with a small tubule at its deep end, and this seemed to me to be pronephric in its nature (figs. 32 and 33). It was, at any rate, the only part of the Wolffian body which had a free peritoneal opening for its tubule. Another view would be, of course, that it is the beginning of the duct of Müller.

In the lower mammals we get very instructive examples of the minute anatomy. I have examined this in several specimens of the chick, and rabbit, and pig embryo (many specimens in serial, transverse and longitudinal section), and found Minot's description correct. The mass of its substance is made up of tubules lined with epithelium, and opening towards the surface of the organ into the Wolffian duct. At the other end of the tubule is a Malpighian corpuscle with a thin lining of epithelium —the capsule of Bowman. We have no exact information as to the mechanism of their excretion, but they are evidently analogous in their function to the permanent kidneys.

Along the outer free peritoneal surface of the Wolffian body runs the Wolffian duct, the collecting tubules opening into it (fig. 34; *vide* also Kollmann, p. 399). The Wolffian duct opens below into the urinogenital sinus (figs. 11 and 12).

The Müllerian ducts in embryos of 7-13 mm. develop at the

5th week as peritoneal involutions on the lateral aspects of the Wolffian bodies, running first to their outer edge and then to the inner surface. They course down and back in close relation to the Wolffian duct, and ultimately end blindly on the back of the urinogenital sinus, immediately above the Wolffian duct openings, and form there the eminence of Müller (fig. 11). The Müllerian duct, as Sedgwick long ago asserted, I consider to be probably of pronephric origin, for reasons to be afterwards given. Gregg Wilson's papers may be referred to for a summary on this point.

A very important point has now to be considered—viz., that in connection with the mesonephros a sexual gland develops, the future testis or ovary, as the case may be.

The indifferent sexual gland first arises in the human fœtus about the end of the 1st month (fig. 34). Nagel has figured it in fœtuses of 12 mm., and Coste has an excellent drawing of it at the same period. It is due to a thickening of the cœlomic epithelium over the mesonephros, and by the ingrowth of this epithelium the ova or seminiferous tubules, as the case may be, arise. In the male, tubules connect the Wolffian duct with the seminiferous tubules, and in this way the Wolffian duct becomes the seminal duct (epididymis and vas deferens). This phase of development in the male need not further concern us, especially as many of the points in regard to the development of the testis require elucidation. As to the development of the ova and Graafian follicles, a good deal of dispute exists; but the most generally accepted view is that the ova are derived from an indipping of the cells of the germ epithelium into the connective tissue of the ovary, and that the cells of the membrana granulosa have also a similar origin. Foulis, on the other hand, believes in an outgrowth of the stroma snaring in the germ-epithelium cells, and that the membrana granulosa cells arise from the connective tissue. My specimen of a month old shows the sexual gland present, and ova in course of formation.

B.—*The significance of the temporary development of the Wolffian bodies in the human embryo.*

As is well known, the mesonephros has only a temporary

development in the amniota, but persists as a permanent kidney (kidney and testis in the male) in the anamnia. Thus, in the human fœtus the mesonephros reaches its full development during the second month and then withers, leaving traces only although the duct has a more permanent adult function. The question arises, therefore, Why do we get this temporary development in the human fœtus? Why does the true kidney not develop earlier?

The usual view is based on the Darwinian theory, and would regard the mesonephros as an ancestral inheritance, used, so far as is necessary, in the development of the organs, but still ancestral.

The view I would advance is as follows: The development of the ovary and testis is one intimately bound up with that of the mesonephros. The mesonephros may, indeed, be considered as a sexual excretory organ. In the amniota the development of the sexual organs is completed early in fœtal life, and the after function of the ovary or testis is to provide a comparatively small number of ova or spermatozoa at long intervals, in mammals at any rate.

In the anamnia, however, the ovaries and testes produce a very large number of their characteristic products, and thus the great local activity of these organs leads to a retention of the mesonephros as an excretory organ in close vascular relations with the sexual organs.

The persistence of excessive ovarian and testicular activity in the anamnia is to be associated with the persistence of the mesonephros.

On this point Noël Paton's researches on the salmon are of value, and the following quotations put the matter briefly:—

"Yearly, or at longer intervals, the fish appear on our coasts, apparently from the deeper waters, and ascend the rivers there somewhere between October and January, to deposit their spawn milt. Having done so, they descend the river as kelts and again disappear in the sea, to return either in the same or in the following year to the fresh water.

"What force urges the fish to leave its rich feeding ground in the sea? Is it necessary that it should enter fresh water in order to perform the act of reproduction? Does it require or

procure any food during its sojourn in the river; and if not, how is it able to maintain life and to construct its rapidly growing genital organs? In the female the growth of these is enormous. In April or May the ovaries constitute only about 1·2 per cent. of the weight of the fish. In November they are no less than 23·3 per cent. In a fish of thirty pounds, in the spring they weigh about 120 grammes, in November they weigh over 2000 grammes. The increase in the testes in the male is not so marked, but is sufficiently striking. In April or May their organs are about 0·15 per cent. of the weight of the fish, while in November they are 3·3 per cent."

C.—*The ultimate development of the urinogenital organs in the male and female tract: the male and female analogues.*

In the fœtus, whatever be its sex, we have a double set of organs, viz., pronephros and mesonephros, with the mesonephric or Wolffian duct and the Müllerian ducts. We have now to discuss the ultimate development of these in the two sexes, and to state the analogous parts (fig. 34).

In the human female the Müllerian ducts form the Fallopian tubes, uterus, and vagina, according to the generally accepted view.

From what I have already advanced, I regard this as only in part correct, and would modify it as follows: The Fallopian tubes, uterus, and upper two-thirds of the vagina are Müllerian, the lower third of the vagina is blended urinogenital sinus and Wolffian ducts. The hymen is developed from the lower ends of the Wolffian ducts. Inasmuch, therefore, as the hymen is developed from the Wolffian bulbs, as I have already indicated, it is evident that the hymen corresponds with the lower ends of the vasa deferentia in the male, and this gives us a most valuable point of comparison between the male and female urinogenital tracts. Hitherto there has been a want of exactitude in our knowledge, owing to the belief that the Wolffian ducts in the female disappeared in their lowest parts, and were therefore practically not represented in the female genital tract. In investigating this point I examined serial sections of male pelves between the 2nd and 3rd month, at the third and a

half month, at the 4th month, and at the fourth and a half month. The following were the conditions found:—

(*a*) The apparent uterus masculinus at the 2nd and 3rd month is really due to fusion of the vasa deferentia.

(*b*) At the 4th month the prostatic gland had developed.

(*c*) At the fourth and a half month I found, near the termination of the vas deferens, a hitherto undescribed bulb of epithelium exactly like the Wolffian bulb of the female. It is remarkable indeed to note this bulb in the male with epithelial cells exactly like those of the adult vaginal mucous membrane. The vas deferens ended near, but not in it, in this specimen.

(*d*) The so-called sinus pocularis in the adult male seems to me, therefore, not to represent the uterus, but the hymeneal end of the vagina, practically those parts of the Wolffian ducts which with the urinogenital sinus form, as I have indicated, the lower third of the vagina.

(*e*) The ducts known as Skene's ducts in the female urethra are really analogous to the prostatic glands of the male. They do not represent any part of Gärtner's canal (Wolffian duct), but are merely prostatic. Of this I have no doubt now. The prostatic glands in the male develop from the urinogenital sinus, and in the female the only prostatic element is to be found in Skene's ducts and the small glandular recesses seen round the urethral meatus.

I must point out, however, that it will be necessary to examine serial sections of full-time male and female fœtuses to determine more exactly the analogues of the seminal vesicles and the more exact anatomy of the common ejaculatory ducts.

So far as I have traced the development in the male, the prostatic openings of the ejaculatory ducts are the lower ends of the Wolffian ducts.

The following table, modified from Quain, gives shortly the views advanced here as to the male and female genital analogues.

We may now trace the analogous parts more in detail. From what I have already said, it is evident that the analogues of the female and male tract are most definitely settled in

Table of Corresponding Parts of the Genito-Urinary Organs of the Two Sexes, and the Embryonic Organs from which they are developed. (Modified from Quain.)

	Embryonic Organ.	Female Organ.	Male Organ.
Genital Ridge:	Germinal Epithelium	Graafian Follicles and Ova	Epithelium of Seminiferous Tubules.
	Mesoblast of Ridge	Stroma of Ovary	Connective Tissue of Testicle.
Müllerian Duct:	Superior Extremity	Fimbriated Extremity of Fallopian Tube	Hydatids of Morgagni.
	Middle Part	Fallopian Tubes	Cornua Uteri Masculini, which sometimes occur.
	Inferior United Part	Uterus and Vagina (*upper two-thirds*)	Uterus Masculinus and Vagina (*two-thirds*).
Wolffian Body:	Superior Tubes	Smaller Tubes of Epoöphoron; Parovarium	Vasa efferentia and Coni Vasculosi.
	Inferior Tubes	Paroöphoron	Paradidymis (Organ of Giraldés).
	Outgrowths from Upper Malpighian Corpuscles	Interstitial cells near hilum of Ovary	Walls of Seminiferous Tubules (?) and rete testis.
Wolffian Duct:	Superior and Middle Parts	Main Tube of Epoöphoron	Vas deferens (in part).
	Inferior Part	Duct of Gartner	Vas deferens (in part).
	Lower Ends	*Wolffian Bulbs and Hymen*	*Colliculus seminalis.*
	Outgrowths from Posterior Part	Ureter; and uriniferous Tubules of Kidney	Ureter; and uriniferous Tubules of Kidney.
Urinogenital Sinus:	Upper Part	Urethra	Prostatic portion of Urethra, as far as Verumontanum.
	Middle Part	*Lower third of Vagina*	Lower prostatic and membranous part of Urethra.
	Lower Part	*Vestibule.*	
	Epithelial involutions on each side of Sinus (lower end)	Glands of Bartholin	Glands of Cowper.
	Genital eminence and folds	Clitoris and Nymphæ	Penis.
	Integument on either side of orifice of Sinus	Labia Majora	Scrotum.
	Outgrowths from Upper Part	*Skene's Ducts*	Prostate.

(The italicised parts show the modifications advanced.)

the upper portions. The disputed points are mainly as to the lower.

The fact that the analogue of the hymen is the vasa deferentia termination in the male colliculus seminalis, enables us, by superposition of diagrams of the early fœtal organs and fully developed adult ones in sagittal mesial sections, to clearly establish practically all the analogues. Thus from the hymen on along the vestibule to the glans clitoridis is equivalent to all in the male urethra below the colliculus seminalis; and if the ventral surface of the male organ were split from this point to the urethral orifice, the female construction would be so far imitated. As to the analogue in the female of the vesiculæ seminales, I have not been able to settle this to my satisfaction, the best opinion yet advanced being that of Bland Sutton, who holds that Skene's tubules represent them. That the ovary and testis are analogues and homologues is evident, but in the present state of dispute as to the development, it would be rash to attempt to push analogies here in detail. In regard to the urinogenital sinus, it has to be noted that in the early fœtus we have as its upper boundary where the eminence of Müller lies, on its posterior wall. The hymen forms at the Wolffian ducts opening, and not at the eminence of Müller, as usually stated. I think it probable that the Wolffian bulbs block the urinogenital sinus, and that the lumen is re-established as a double one, urethral and vaginal, by involutions from the sinus below. Thus in the female, the vestibule, lower third of the vagina, and lower end of the urethra represent the original sinus urinogenitalis. In the male, of course, all below the colliculus seminalis represents it, with this difference that it forms a real canal, and not practically a hypospadias as in the female, the penis being greatly developed as compared with the clitoris. The upper portion of the urethra and the bladder in the female, and all above the sinus pocularis in the male, are of course derived from primitive gut and allantois.

I need hardly indicate that the labia majora represent the scrotum split sagittally and mesially, and that the labia minora are the ununited edges of the urethral groove.

Above the colliculus seminalis the task of identification of the analogues is fairly easy. No part of the vas deferens is

normally represented in the human female until we come to the interval between tube and ovary, where we have the main tube and tubules of the epoöphoron (parovarium). The tubules of the Wolffian body are represented in the female by the parö-öphoron tubules at the hilum, and by the epoöphoron or parovarium higher up.

In the male we get remnants of the Wolffian body in connection with the testicle, the well-known organ of Giraldés, or paradidymis. The ducts of Müller, strictly speaking, are not in my opinion represented in the male at all, except by the hydatids of Morgagni and the rare cornua uteri or uterus and vagina occasionally found. (Primrose.)

The sinus pocularis represents, I believe, the junction of Wolffian ducts and part of urinogenital sinus. Of course, if one holds to the vagina being Müllerian in all its extent, the sinus pocularis will represent the lower part of the Müllerian ducts.

We have now to try to understand the reason for this apparently extraordinary development of the genital organs. It seems remarkable that we should have apparently a double genital tract to start with, and that each sex should, in its adult and normal condition, retain traces, so far as we know, functionless, of the opposite sex.

In the early human embryo we have a very remarkable condition present, which I may recapitulate as follows :—

1. A very rudimentary pronephros or head kidney (?).
2. A well-marked mesonephros, or Wolffian body proper, with a duct.
3. An indifferent sexual gland developed in connection with the mesonephros. When this is an ovary, we get—
4. A special female genital duct, the Müllerian retained. Should this gland be a testis, we get—
5. The Wolffian duct persisting as its vas deferens.

This, however, does not exhaust the peculiarities, as we find that when the sex is female we get parts of the mesonephros and its duct normally persisting as well-marked vestiges, and aiding in hymeneal and vaginal development, as I have already described. When, however, the fœtus is of the male sex, we get hardly any trace of the Müllerian duct except Morgagni's

hydatid; that is to say, the adult female has more representative traces of the male sex than the male sex has of the female. This seems to me very remarkable, and worth investigation.

The testis and vas deferens develop from or in connection with the mesonephros, which is the strongly developed portion of the Wolffian bodies. What develops the Müllerian duct or its anlage? The present current answer is that the Müllerian duct develops later than the Wolffian, and apparently is developed by an invagination of the cœlomic epithelium, *i.e.*, of the epithelium of the peritoneal cavity. As I have already hinted, it may develop from the rudimentary pronephros, as in some of the lower mammals. At any rate, the Fallopian tube and ovary are formed on a Wolffian type, as we have the funnel-shaped opening and the duct passing down as uterus and vagina, finally to blend with the Wolffian duct at the hymen. It has, of course, long been held by some observers that the duct of Müller was pronephric. (Sedgwick).

We may say, then, that the early fœtus is not hermaphroditic or double-sexed. There is never ovary and testis, but only an indifferent gland at first. The essential point seems to be that we first get the Wolffian bodies or temporary kidneys formed, and these are developed apparently as sexual kidneys, which wither in advanced vertebrates when the ova and spermatozoa are fairly formed. They are utilised, as far as possible, in the development of the conducting parts of the genital tract, and thus from pronephric epithelium the Müllerian duct probably arises, while the whole of the mesonephric duct and part of the mesonephric tubules are utilised for the testis.

The conducting part of the genital tract is thus practically an adaptation of the Wolffian scaffolding, and the persistence in the female of such well-marked functionless portions as the epoöphoron and paroöphoron is to be associated with the fact that the mesonephros is the best developed part of the Wolffian body, its duct is taking part in the development of the female fœtus as late as the third and a half month. If we grant the pronephric anlage of the Müllerian duct, the more marked atrophy of the latter in the male is to be correlated with its origin from a more rudimentary part of the Wolffian system.

D.—*The homology of the male and female sexual function.*

An interesting parallel can be drawn between the male and female sexual functions. The female supplies an ovum which is discharged along the Fallopian tube, and, if impregnated, is developed, as a rule, in the uterus. The ovum is a modified cell from the specialised cœlomic epithelium, *i.e.*, is a peritoneal cell, and is passed along a duct which, if not pronephric, is at least modelled on a pronephric or mesonephric type. The discharge of the ovum is probably a specialised Wolffian function. The spermatozoon is also part of a modified peritoneal cell, and is discharged along the vas deferens, *i.e.*, Wolffian duct. The discharge of the spermatozoon is thus practically a specialised Wolffian function.

VII. The Relation of the Views Advanced to Certain Developmental Arrests in the Urinogenital Tract.

I take up only those cases which are, for whatever reason, permanent developmental arrests, and I consider specially only some of the rarer ones which have come under my own personal observation. For clearness, however, I shall repeat a resumé of normal developmental stages. Normal development may be summed up as follows:—

Stage.	*Date.*
1. Division of primitive gut into bladder, rectum, and urinogenital sinus; cloacal membrane present; withering of end gut (pars ultima), ...	20th to 23rd day.
2. Communication of pelvic end of urethra and rectum with exterior by formation of ectodermic plug; its breaking down, and thus existence of ectodermic cloaca,	4th to 6th week.
3. Closure of cloaca by Reichel's Analhöcker, ...	7th to 8th „
4. Urinogenital sinus completely formed with ducts of Müller related to it, and Wolffian ducts opening into it, . .	8th to 9th „
5. Hymen formed, anus formed, preputium clitoridis in course of formation; Müllerian vagina being relined from Wolffian bulbs, ...	3rd and 4th month.

I need not recapitulate the well-known facts as to the appearance of the ducts of Müller, and their time of fusion so as to form the uterus and tubes (*vide* Hart and Barbour, 5th edit., p. 291).

The special malformations I have been able to study belong mainly to the rarer forms, and comprise—

1. *Fœtus without urinogenital system.*
2. *A pediculated tumour attached to the perineal region of a female infant, which on removal and microscopical examination proved to be a piece of isolated bowel, probably persistent end gut.*
3. *Two cases of transverse septum vaginæ dividing the vagina into a lower third and upper two-thirds.*
4. *A case of atresia of the lower third of the vagina, the rest of the tract being developed.*
5. *Case of vertical ridge on the anterior vaginal wall, with another corresponding ridge on the upper two-thirds of the posterior vaginal wall.*

1. *Fœtus with no urinogenital system.*—This remarkable specimen, for which I am indebted to Mr Miles, was an eight-months' fœtus with no permanent anus, and no representative of external genitals except a strap-like projection of skin from the pubes about an inch long.

On sagittal mesial section I found no bladder, only primitive gut; a rudimentary allantois above the pubes, no internal genitals, and no ureters or kidneys.

I do not purpose discussing this remarkable case fully, but merely point out that it justifies—

(1) The consideration of the urinogenital organs as forming a correlated system.

(2). The views of Lieberkühn and Keibel as to the development and origin of bladder.

These investigators derive it from the primitive gut, and only its apex from the allantois. If in this case we had some early destruction of Wolffian duct, it would account for the absence of ureter and kidney. In some cases, however, a rudimentary kidney has been noted by Ballantyne, and this points to the

kidney not being entirely a Wolffian duct derivative. The non-division of the primitive gut into its rectal and bladder portions is difficult to explain.

2. *A pediculated tumour attached to the perineal region of a female infant, which on removal and microscopical examination proved to be a piece of isolated bowel, probably persistent end gut.* —This rare, and, so far as I know at present, unique case occurred in the practice of Dr Inch of Gorebridge. When I saw it with him, the child was a week old and was in every respect healthy and normal, except that while it had the genitals of a female child, there was attached to the skin surface between anus and vagina what seemed to be a scrotum with an anterior opening, into which a probe passed for a short distance.

The annexed diagram (fig. 36) shows that the child had the external female genitals normally developed, except that the preputium clitoridis was split into two halves. So far as I could ascertain, the cavity of this tumour communicated with no organ, and gave no secretion. It seemed to me to be scrotal at any rate, with or without testicle, and I thought it best to consider matters before removal. I could find no such case recorded, and could advance no thorough explanation of its nature. As the parents were greatly distressed at this strange malformation, and as I was certain it had no communication with any organ or with peritoneum, I ultimately removed it, first transfixing and ligaturing the neck. The child did not suffer afterwards, and is now quite well. On laying open the tumour, I found the cavity already alluded to, but nothing else except fat and skin.

On microscopical examination, I was very much astonished to find the cavity lined with Lieberkühnian follicles, and no testicular tissue present. We have, therefore, to explain the strange anomaly of such a rare and unusual condition.

If we take Keibel's diagrams (figs. 1 and 2) of the lower end of an early human fœtus 3 mm. long, we see displayed the structure known as the cloacal membrane. This is the anterior boundary of the part of the primitive gut known as the entodermal cloaca, from which, as I have already explained, the rectum and bladder are formed by coronal partitions (figs. 6-9). This cloacal membrane extends from the root of

navel back to the top of the portion of the primitive gut, which atrophies usually. The aberrant tumour I have just described seems to me to be the persistent end gut; and if this be the case, it is of importance as helping to determine the posterior end of the cloacal membrane.

The value of my case, if my view be right, is this, that it establishes in the new-born child the posterior boundary to which the cloacal membrane extends, viz., to the vagina. It also shows that the split clitoris is not a proof that the glans develops from two halves originally.

3. *Two cases of transverse septum vaginæ dividing the vagina into a lower third and upper two-thirds.*—This is the rarer form of so-called atresia hymenalis vaginæ. We have the external genitals developed normally, a hymen present, as in one of my cases where the patient was a girl at puberty, with the vagina apparently an inch long, and evident pressure symptoms and retention of urine. When I saw her the urinary retention had been relieved, and there had been a discharge of much tarry blood from the vagina. As a tumour had previously protruded at the vulvar orifice, I examined carefully, and found the hymen and external genitals developed, while an inch from the hymeneal edge a transverse septum could be felt with a lacerated tear through its substance on the left side. When this laceration was dilated, I could pass my finger into the rest of the vaginal canal—the real Müllerian portion. The rest of the genital tract was normal.

The second case was that of an adult woman who had menstruated scantily and with pain. In her the same condition of a transverse septum an inch from the hymen existed, and of the condition I was able to take a cast. There was evidently a small aperture in the septum, as I could dilate a sinus and make a lateral canal admitting the finger. I did not detect a cervix. The uterus bimanually seemed unicornuous, and the ovaries were both present.

Each of these cases had, therefore, the lower third of the vagina present—*i.e.*, that part derived from the blending of the urinogenital sinus and Wolffian ducts. Such cases are only to be understood in the light of the origin of the vagina, as brought forward in the present investigation.

4. *Case of atresia of the lower third of the vagina, the rest of the tract being developed.*—In this case, that of a prostitute in the Royal Infirmary, whom I saw through the kindness of Mr Caird, there was an interesting persistence of a verticle ridge both on the anterior and posterior vaginal walls. The ridges differed, inasmuch as the posterior one ceased about an inch from the vaginal entrance, while that on the anterior wall ran along the whole distance, and had quite an excrescence at its lower end. The ridge on the posterior wall probably represented the remains of the Müllerian septum, while that on the anterior was the remains of the septum between the Müllerian ducts and Wolffian bulbs.

We can thus give the probable antenatal date of the deformities recorded :—

1. Congenital perineal bowel tumour in 3rd-4th week.
2. Septum vaginæ (transverse), 6th week-8th week.
3. Vertical ridges, 4th week.

VIII. On the Nature and Development of Mucous Membranes.

There is admitted difficulty in defining what we mean by "mucous membrane"; and Bland Sutton states that practically there is no difference between skin and mucous membrane. Hair, he believes, can grow on mucous membrane; and in his work on Dermoids he considers the Graafian follicles as practically mucous follicles,—*i.e.*, with the power of producing skin products.

A study of the development of the prepuce of the clitoris and penis, and of the development of the permanent lining of the vagina, seems to me to throw some light on this question, and therefore I purpose to consider it at this stage. I accordingly consider—

1. *The behaviour of mucous membranes when everted.*
2. *The development of the anus and of the prepuce of the clitoris and penis.*

1. *The behaviour of mucous membranes when everted.*—The gynæcologist has good opportunity of observing this in

certain clinical cases. Thus in prolapsus uteri and in tears of the perineum sufficiently extensive to involve the anus and rectum, he can observe how the exposed mucous membranes alter or remain moist when exposed to unusual friction or irritation.

The vaginal lining is generally described as mucous membrane, although many consider it as more correctly presenting greater affinity to skin. In the natural condition its free surfaces are moist and rose-coloured, but when these are everted, as in prolapsus uteri, they take on all the dryness and appearance of ordinary skin. The same holds good for the glans penis after circumcision. In marked contrast with this is the condition of the rectal mucous membrane in complete anal tear. Here the everted mucous membrane of the rectum retains its fresh red colour and moisture, and never approximates in appearance to skin. The anal lining, however, is hardly distinguishable from skin. All these surfaces are, however, indiscriminately classed as mucous membranes, although their behaviour under altered conditions of friction and pressure is so different; and the question may be asked, What is it that makes the differeuce? The answer to this involves some questions of development which we must now recapitulate.

2. *The development of the anus and of the prepuce of the clitoris and penis.*—The lining of the rectum is a hypoblastic structure, while that of the anus is epiblastic. In the three and a half months' fœtus one can see the epidermis passing in at the anal site, and at the top of the anus gradually passing into that of the Lieberkühnian follicles (fig. 19). The superficial cells of the epidermis so passing in are necessarily central, and as they desquamate, form the lumen.

The views advanced by embryologists as to the development of the prepuce are discordant, and in some respects unintelligible. Milnes Marshall, for instance, says: "The prepuce appears towards the end of the 3rd month as a fold of skin round the base of the glans, and is at first interrupted ventrally by the urethral groove" (p. 597, 1893). Minot (pp. 517-9, edit 1897) gives two accurate, though rather ill-defined drawings, and says: "The prepuce appears as a slight ridge which overgrows the glans, the epithelium of the inner surface uniting as

the fold blends with the epithelium of the glans — the two epithelia fusing into one solid plate."

With this description I disagree, and the account I urge as a more correct one is already given at page 268.

There is thus a close parallel between this development of the prepuce and that of the vaginal lining. The vaginal lining is derived from the Wolffian bulbs, and they render the previous Müllerian lumen of the vagina solid, and when central desquamation takes place a fresh lumen is formed. The Wolffian bulbs are of course epiblastic in origin (*vide* p. 270).

To understand the difference in behaviour of the mucous membranes when exposed to pressure, we must remember their origin. The so-called mucous membranes of the inner surface of the prepuce, anus, and vagina are epiblastic in origin, and revert to epidermis when eversion is permanent. They should be thus classed as epiblastic mucous membranes or muco-cutaneous surfaces (Turner). Rectal mucous membrane, on the other hand, is hypoblastic in origin, is a true mucous membrane with a mucous secretion, and takes on no squamous character when everted permanently.

In regard to the relining of the vagina from the Wolffian bulbs, I wish to point out that in the ureter and bladder we have a mucous membrane made up of a many-layered epithelium. The interesting query suggests itself as to the origin of this lining. The ureter splits off from the Wolffian duct and is thus epiblastic. The bladder, however, is allantoic at its apex, derived in the main from the primitive gut (*vide* postea, p. 310), and is thus hypoblastic in origin. Is it relined through the epiblastic ureter as the vagina is through the Wolffian duct? It would be interesting to know what naked-eye changes took place in that mucous membrane of extroverted bladder after the ureters had been transplanted with the rectum. Probably the exposed bladder would become skin-like and lose its moist condition.

IX. Summary.

1. The genital organs in the adult mammal arise from, and in connection with, the Wolffian bodies, the Wolffian duct and the ducts of Müller.

2. In the lowest female mammal examined (rat kangaroo

as type of Marsupials) the urinogenital ducts are least modified; *the Wolffian ducts being represented by the lateral vaginal canals and epoöphoron, while the paroöphoron is present as a duct in the centre of the ovary.* The Müllerian ducts are present as the Fallopian tubes and uterine cornua, while the central vaginal canal represents the rest of the Müllerian tract. The urinogenital sinus is present apparently unaltered, and the whole arrangement is like the human fœtal condition at the 6th to the 7th week.

3. In the adult human female the genital tract has the Wolffian body represented by the epoöphoron (normally present) and by traces of the paroöphoron at the hilum of the ovary. The Wolffian duct is represented normally near the epoöphoron and rarely by occasional traces in the broad ligament and uterus. The lowest segment of the vaginal portion of the Wolffian duct forms the hymen by the coalescence of bulbous proliferations there, and cells from these replace the primitive lining of the Müllerian vagina.

The vagina is Müllerian only in its upper two-thirds; the lower third is formed by the coalescence of the Wolffian bulbs and urinogenital sinus.

4. Between the lowest and highest female mammals there are gradations in the representation of the Wolffian ducts in the genital tract. This still requires determination. It is known that the Wolffian ducts persist to a marked extent in the cow and sow (Gartner's canal), and additional mammals must therefore be examined as to the point.

5. The colliculus seminalis of the adult human male is the analogue of the hymen and lower third of the vagina. The Müllerian ducts are not represented in the adult human male so far as is known—except by the hydatid of Morgagni and some rudiments near the testis.

6. Skene's ducts in the female urethra are prostatic analogues, but the nature and analogues of the vesiculæ seminales are as yet not accurately determined.

7. The spermatoon is a specialised pleuro-peritoneal cell, and its excretion is practically a specialised Wolffian function.

8. The ovum is a specialised pleuro-peritoneal cell, but its excretion is along a duct formed later than the Wolffian one,

and cannot be represented as a specialised Wolffian function, unless we hold that the Müllerian duct has a pronephric anlage.

9. In the formation of the lumina of the preputium clitoridis, vagina, male urethra (spongy portion and glans), and permanent anus, the epidermis between the 2nd and 4th month of fœtal life is the active agent. First a solid plug of epidermis passes in, with its superficial cells central, its more active ones deep; desquamation of the central cells ensues, and thus the lumen remains lined with cells of an ectodermic origin.

10. True mucous membrane is hypoblastic in origin.

Description of Plates XXXV., XXXVI.

Fig. 1. Vertical mesial section of caudal end of 4·2 mm. fœtus (Keibel). Note formation of primitive gut with Wolffian duct opening into posterior part: cloacal membrane, *a*, is anterior boundary of entodermal cloaca (pars penultima of primitive gut); tail gut, *b*, present.

Fig. 2. Blastula stage of Amphioxus (Hatschek), $\frac{220}{1}$.

Fig. 3. Gastrula stage of Amphioxus (Hatschek), $\frac{220}{1}$.

Fig. 4. Dorsal view of 2 mm. human embryo, $\frac{14}{1}$. P.S., primitive streak; N.T., neurenteric canal entering yolk sac; N.G., neural grove; H.P., head end of embryo, $\frac{14}{1}$ (Graf Spee).

Fig. 5. Embryo, H.*s.f.*, 6·5 mm,; *a*, tail gut withering; *b*, ureter budding off from Wolffian duct (Keibel.)

Figs. 6-9. T.S. of 4·2 mm., human embryo, showing stages of division by coronal partition of primitive gut into rectum and bladder (Keibel). *r*, rectum; *b*, bladder.

Fig. 10. To show view that bladder originates from allantois (Allen Thomson). *r*, rectum; *b*, bladder; *u.g.s.*, urinogenital sinus.

Fig. 11. Genital cord in 6-7 weeks' embryo (30 mm.), showing in front the urinogenital sinus with eminence of Müller, *below* which the hymen forms (T.S.). *s*, urinogenital sinus; W, Wolffian duct; *m*, duct of Müller.

Fig. 12. Genital cord immediately below that of fig. 11 (T.S.) shows urinogenital sinus with Wolffian ducts opening into it. This is site of future hymen.

Fig. 13. Genital cord below that of fig. 12 (T.S.), to show anlage of H-shape of adult vagina near vaginal orifice; urinogenital sinus in front, and behind, Wolffian ducts on each side of canal of coalesced Müllerian ducts.

Fig. 14. T.S. of 6-7 weeks' embryo, to show kidney and Wolffian body. *k*, kidney; W.B., Wolffian body.

Fig. 15. T.S. of 6-7 weeks' embryo, to show ovary formed on Wolffian body. *o*, ovary; W.B., Wolffian body.

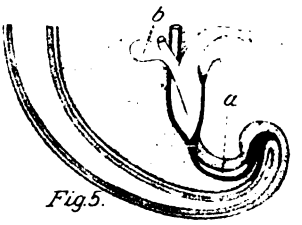


Fig.5.

Fig.6.

Fig. 7.

Fig. 8.

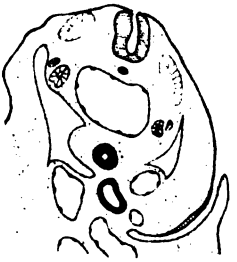


Fig. 9

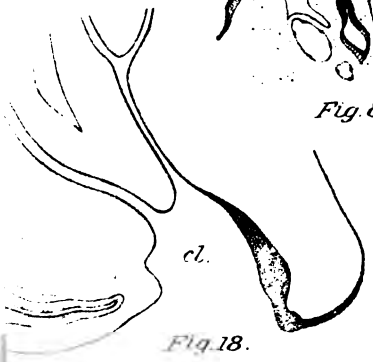


Fig.18.

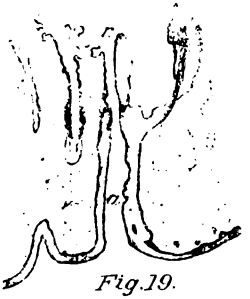


Fig.19.

Fig. 20.

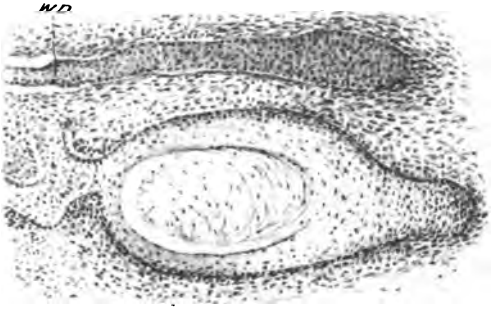


Fig. 21.

Fig. 25.

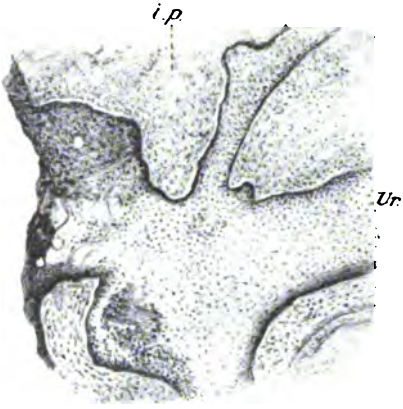


Fig. 26.

Fig. 35.

Fig. 36.

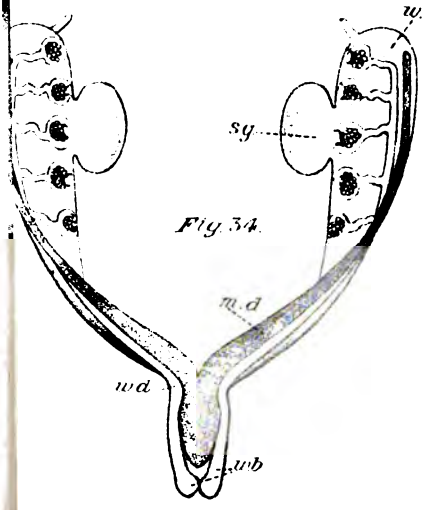
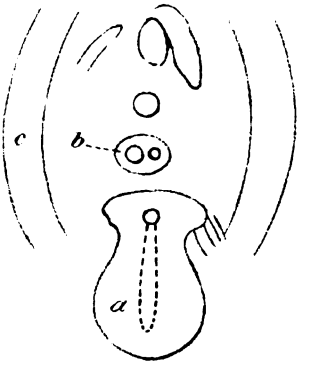


Fig. 34.



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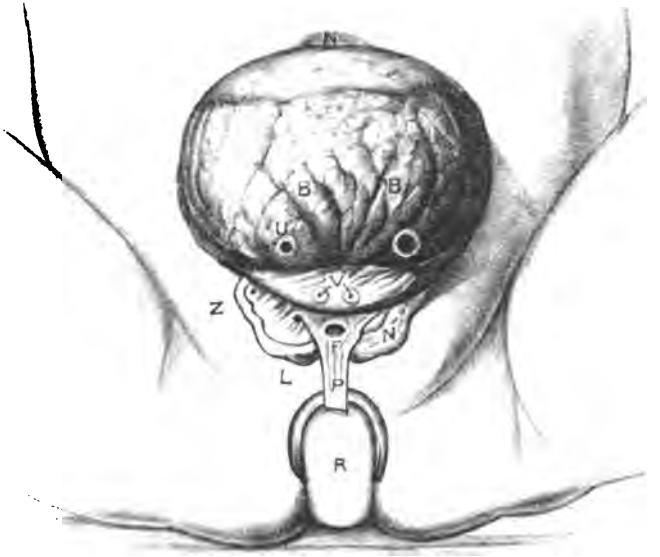

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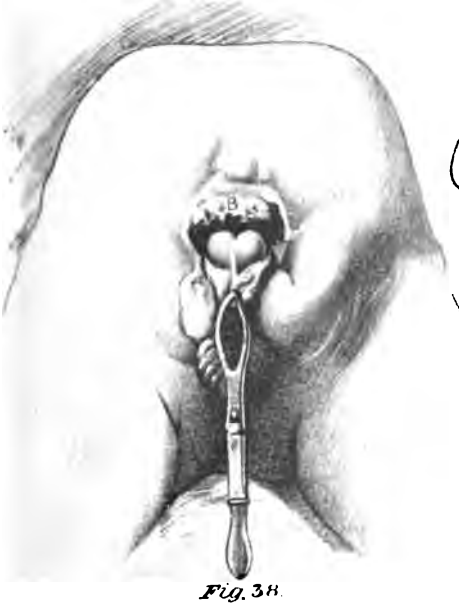

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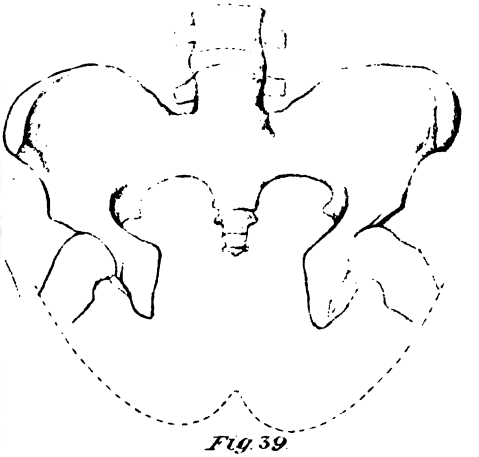

Fig. 39.

Fig. 16. Vertical mesial section of fœtal rabbit, 10 mm., 13th day, to show primitive gut with partition forming to divide off bladder and rectum, and passing down to meet epidermic plug (Retterer).

Fig. 17. Vertical mesial section of tail-end of rabbit, 14th day, showing division of primitive gut into rectum and bladder, and union of partition with epidermic plug (Retterer). *e.p.*, epidermic plug.

Fig. 18. Sagittal mesial section of human embryo, 25 mm., to show ectodermic cloaca, *c.l.* (Tourneux).

Fig. 19. Development of permanent anus by inward passage of epidermis, and central desquamation at about 3rd month. *a*, anus; *r*, rectum.

Fig. 20. Sagittal mesial section of three and a half months' embryo, to show formation of prepuce of the clitoris and development of hymen. S.U.G., urinogenital sinus (part to form vestibule); W.B., Wolffian bulb; UR, urethra; *e.p.*, epidermic plug to form prepuce ($\frac{2}{1}$).

Fig. 21. Wolffian bulbs; note Wolffian duct ending in smaller one. W.D., Wolffian duct ($\frac{2}{1}$).

Fig. 22. Coronal section of pelvis of four and a half months' fœtus in line of pubic arch, to show hymen. Note two lateral parts of hymen, one from each Wolffian bulb. H, hymen; B.*g.*, Bartholinian gland.

Fig. 23. Outline of formation of vagina, showing upper two-thirds originating from the ducts of Müller, the lower third from urinogenital sinus and Wolffian bulb. *c.c.*, cervical canal; A, Müllerian part; B, part derived from Wolffian bulbs and urinogenital sinus.

Figs. 24 and 25 show sagittal mesial section of penis of three and a half months' fœtus. Fig. 25 shows epidermis (*a*) passing in behind frænum under a higher power.

Fig. 26. Section of glans penis, showing formation of prepuce and tunnelling of glans, near full time. *p*, prepuce; *ur*, urethra.

Fig. 27. Genital tract of Rat Kangaroo. K, kidney; U, ureter; C, cornu; *l.c.*, lateral canal; *m*, central part.

Fig. 28. Genital tract of Macropus Benneti (Brass).

Fig. 29. Genital tract of Wombat (Brass).

Fig. 30. Uterus of Rat Kangaroo, to show mucous membrane (*m*).

Fig. 31. Genital cord of Rat Kangaroo. *l.c.*, lateral canal; *m*, central vagina; *u.r.*, urethra.

Fig. 32. Sagittal lateral section of 4 weeks' human embryo (10 mm.) to show Wolffian body. Note apparent pronephric tubule (*a*) at top of Wolffian body. Tubules, glomeruli, and duct of mesonephros are seen. W.D., Wolffian duct.

Fig. 33. Pronephric tubule of above.

Fig. 34. Nagel's diagram of urinogenital organs in human embryo, *modified by prolongation of lower ends of Wolffian ducts.* *m.d.*, Müller's duct; *w.d.*, Wolffian duct; *w*, Wolffian body; *s.g.*, Sexual gland; *w.b.*, Wolffian bulbs.

Fig. 35. Ovary and tube of Rat Kangaroo, with Wolffian duct (W) in centre of ovary.

Fig. 36. Diagram of persistent end gut in new-born child. *a*, tumour with lumen; *b*, vaginal entrance; *c*, labium majus.

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CONTRIBUTIONS TO THE PATHOLOGY OF THE BLADDER AND URETER—EXTROVERSIO VESICÆ AND APPARENT LOW IMPLANTATION OF THE URETER END.

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I WISH to consider more fully in this communication two comparatively rare malformations — extroversio vesicæ and low implantation of the apparent terminus of the ureter. I had alluded to the nature of the former in the preceding paper, and wish to elaborate that explanation more fully. The low implantation of the ureteric end is much more uncommon than extroversion of the bladder, and the explanation of its nature also arises indirectly from the views expressed in the same paper as to the fate of the lower segment of the Wolffian duct.

I. EXTROVERSIO VESICÆ AND ITS ALLIED LESIONS.

The causation of extroversion of the bladder, from an embryological point of view, has attracted of late little attention in this country, despite the able papers of Wood and of Champneys, and the more recent work of Kölliker, Graf Spee, Lieberkühn, Tourneux, Retterer, Keibel, and others.

In prosecuting a research on the morphology of the urino-genital tract, the question of extroversion of the bladder came up, and as some obscure points seemed to me to be cleared up by my own work, I went into the matter more fully, and now wish to give my results. The descriptions of the development of the bladder current in British text-books have not sufficiently

noted more correct views, and this is an additional reason for a reconsideration of this subject.

. .Through the kindness of Dr Champneys, of St Bartholomew's, London, I obtained a coloured drawing of his valuable specimen. To Professor MacEwan, of Dundee, I am greatly indebted for a photograph and cast of a case in a young boy under his charge, and also for an interesting skiagram of the pelvis, showing a markedly cleft condition at the pubes. So far as I am aware, this is the first skiagram of this condition taken (figs. 37, 38, and 39).

In considering this matter, I purpose taking up the following points:—

1. *The anatomy of extroversion of the bladder and of allied conditions in the same region.*
2. *The origin of the bladder and the anatomical relations of the cloacal membrane.*
3. *The nature of extroversion of the bladder and allied conditions in the same region.*

1. *The anatomy of extroversion of the bladder and of allied conditions in the same region.*

In the mesial abdomino-vulvar region, from navel down and back to anterior margin of perineal body, we may have a fissure varying in depth and extent from a mere cutaneous cicatrix or a dehiscence of the abdominal walls laying bare the anterior aspect of the bladder, to one where the posterior wall of the bladder and urethral walls are exposed and the pelvis cleft anteriorly; while between these extremes we may have varying amounts of epispadias and bladder exstrophy. As is often the case in malformations, others of a dissimilar nature may be present.

The most marked form of the lesion is that known as extroversion of the bladder, often associated with epispadias and cleft pelvis, and it is this I wish specially to consider at present.

I shall describe therefore (1) *an ordinary case of extroversion in an adult woman;* (2) *one in a newly-born female child;* (3) *one in a newly-born male child.*

(1) *Extroversion of the bladder in an adult woman.*

Klein's case, which I summarise, is interesting, as the patient became pregnant and bore a healthy child.

The navel was not present in this case, the bladder was extroverted—*i.e.*, its posterior aspect was exposed in the region of the space between the pubic ends. The exposed bladder surface measured 5 cm. × 3·5 cm., and from the ureters urine passed in occasional jets. Below this the posterior urethral wall was exposed, 5 cm. broad by 1 cm. long.

The vaginal entrance was transverse, with the anterior vaginal wall projecting. The labia majora and minora were separated above and below; the clitoris was absent, but may have been represented by traces at the upper ends of the nymphæ. The pelvis was split at the symphysis, the ends being 9·5-10 cm. apart.

This is a fairly typical case in an adult woman who passed through a normal pregnancy and an almost normal labour.

Klein gives a table of seven labours with this anomaly, but probably some have not been recorded.

In almost all the cases the perineum gave trouble, requiring incision, and forceps had to be applied to the head.

I do not consider the question of the split pelvis. It is important to note, however, that fascia unites the separated ends in most instances. In cases of this anomaly not surviving birth, or dying soon after, the lesions are often associated with others not necessarily depending on the extroversion.

Champneys has published a very ably recorded case with some special points of interest, in an infant which died a month after birth. It was a female child, and had extroversion of the bladder, no navel nor urethra, and prolapsus recti was present. The special feature was that two openings lay below the ureteric ones, and these, on post-mortem, were found to open into the vagina. Uterus and ovaries were present. Champneys describes these two openings as Müllerian, but I think they can be more accurately held to be the lower ends of the Wolffian ducts. In the paper on the morphology of the human urinogenital tract, already alluded to (see the preceding paper), I attempted to show that the hymen was derived from the Wolffian ducts,

and that the upper two-thirds of the vagina alone were Müllerian, the lower third being made up of blended urinogenital sinus and Wolffian ducts.' In Champney's case we have the urinogenital sinus cleft in front, and the ducts exposed as they lie in that sinus about the second month of intra-uterine life. The opinion Champneys adopts—viz., that they are Müllerian—was the only one possible at the time his paper was written (fig. 37).

A full and accurate account of the other features of the interesting case is given, but they do not call for remark at present.

Opitz has recently published a similar case. He does not state, however, the relation to the vagina of the two ducts I have considered to be Wolffian.

An interesting and analogous case in a male child has been recently published by V. Steinbüchel. Here there were also two openings below the ureter, as in Champneys' case, the openings of the ejaculatory ducts. This confirms the view of these openings I have taken in Champneys' case, and satisfies the analogy I attempted to establish between the lower ends of the ejaculatory ducts and that of the lower third of the vagina, as well as the analogy between colliculus seminalis and hymen.

Above the ureteric openings were two slits communicating with malformed bowel. V. Steinbüchel discusses this carefully, but an exact explanation of this special anomaly is difficult to give. Many authors have drawn attention to the fact that in extroversion of the bladder it looked as if there were two halves separated. The apparent cause of this will be considered afterwards.

To understand such an interesting anomaly as extroversio vesicæ, we must now consider—

2. *The origin of the bladder and the anatomical relations of the cloacal or anal membrane.*

The bladder is usually but erroneously described as originating entirely from the allantoic stalk—*i.e.*, from the part of the allantois supposed to be pelvic. Allen Thomson's diagram, fig. 10, shows this view well. As the allantois is a diverticulum or growth from the gut, and if there be no stage earlier than

what this diagram represents, it is an exceedingly good explanation of bladder origin. It pictures the lower end of the allantois coming off from the lower end of the gut in the pelvis, its lower pelvic part forming the urinogenital sinus, the upper pelvic part the bladder, and the uppermost part the urachus running up in the abdominal wall to the navel. One often sees the urachus like a narrow piece of tape in the abdominal wall during abdominal sections. The Wolffian ducts thus open into the stalk of the allantois, according to this view of bladder origin. In regard to the allantois of the human embryo, we now know that there is no vesicular or free part, as in some of the lower mammals, or in the chick. The existence of the urachus, or of patent urachus, with its necessary bladder connection, shows, however, that the allantois takes a certain part in bladder formation, but the valuable diagram of Allen Thomson, which has so long illustrated our anatomical textbooks, indicated a comparatively late stage of bladder development—about the 7th week—where the bladder, urinogenital sinus, and rectum have been formed after prior changes then unknown (fig. 10, Pl. XXXV.).

This view was first controverted by Rathke, in 1832, but received its death-blow from the work of Lieberkühn and Keibel.

I have not as yet had access to Lieberkühn's Memoir, and therefore take Keibel's Monograph. The guinea-pig has only a transient allantois, and develops its bladder when no allantois is present. Further, transverse sections of the caudal end of the guinea-pig show that the primitive gut at this end becomes divided by coronal folds into an anterior and posterior cavity, from the former of which the bladder and urinogenital sinus arise. A peritoneal duplicature completes the separation.

The same is found to happen in the human embryo. For the study of the facts bearing on the development in the human embryo, we may take Graf Spee's embryo, 2 mm. in length, and three specially considered by Keibel—viz., E.B., His' embryo, 3 mm.; a second one, H.s.J., 3·2 mm.; and a more advanced one, H.s.f., 6·5 mm.

Graf Spee's requires to be considered from the dorsal aspect, and also in sagittal mesial section.

On viewing the dorsal aspect with the amnion removed, we see posteriorly the body stalk, then comes the primitive groove (two ridges with the primitive streak between), while the neurenteric canal lies at the anterior margin of the primitive groove. The primitive streak is present as an ectodermic thickening (fig. 4, Pl. XXXV).

This diagram shows clearly that the neurenteric canal is a communication between entoderm and ectoderm, running between yolk sac and amniotic cavity through the medullary plate. The rudimentary allantoic stalk is seen passing from yolk sac into body stalk, but of a bilateral development of the allantois we have no evidence in the human embryo (figs. 1, 4, 6-9).

By a ventral unfolding of the blastodermic edge towards the future navel, we get the primitive gut formed, and this accordingly *gives the area of the neurenteric canal a ventral position* —*i.e.*, it is converted into part of the anterior boundary of the primitive gut—the cloacal membrane.

This is well displayed in Keibel's model of His' embryo E.B. (fig. 1), 3 mm. long, and in the embryo H.s.J., 4·2 mm. long.

We see here the caudal division of the primitive gut, with the Wolffian duct opening into what will be its anterior bladder division (H.s.J. and H.s.f.). There are two parts of this caudal primitive gut—(1) the end-gut, which withers, and (2) the portion between the future navel and end gut, known as the entodermal cloaca. This is the gut, undivided as yet, from which bladder and bowel are to arise. Lateral folds, and in all probability a peritoneal vertical dip, divide off the primitive gut into bladder in front and bowel behind, as in the guinea-pig (figs. 6-9). As the Wolffian ducts open into the bladder division, we understand how, after the ureter has budded off from the Wolffian duct (H.s.f.), and the trigone of the bladder developed at their junction, we get the ureter opening into the bladder and the Wolffian ducts into the sinus lower down. *The after development of the Müllerian ducts in the female carries the Wolffian openings further down to form the hymen.* The bladder is thus developed in the main from primitive gut, only its apex being allantoic.

A very important point as to the anterior boundary of the

entodermal cloaca now requires description. This is known as the cloacal membrane, and, as was first pointed out by Kölliker, and afterwards confirmed by others, it has at one time no mesoblast, and is thus a part structurally weak. The upper boundary of this membrane is the navel, and its lower the junction of end gut and entodermal cloaca. In the adult this lower point is on the perineal body in front of the anus, as in a rare malformation, viz., persistent end gut in a female child; I found this part of the gut attached to skin in front of the anus (fig. 18, preceding paper, p. 294). In the adult, therefore, the cloacal membrane is represented by the mesial region from navel back to perineal body—the anterior boundary of bladder, pubes, urethra, and vestibule. We have now to discuss the significance of the neurenteric canal and of the cloacal membrane. Kowalewsky was the first to show that in the echinodermata a free swimming larval form was formed by an invagination of ectoderm, and that we thus got a two-layered condition—ectoderm and entoderm—with the blastopore of Lankester as evidence of invagination. This form is known as the gastrula, and the process I have described as gastrulation. Haeckel's gastrea theory—viz., that in higher animals we would have the same process—has been amply confirmed, and the neurenteric canal in the human embryo may be regarded as a variety of gastrulation. Selenka has found conditions exactly similar to those of Graf Spee's embryo in the Bornean gibbons (figs. 2, 3, and 4).

The cloacal membrane is practically derived from the blastopore or neurenteric canal, *i.e.*, the dorsal area with neurenteric canal, as in Graf Spee's embryo, by a ventro-caudal infolding becomes cloacal membrane, or boundary between the entoderm of the entodermal cloaca and the ectoderm, and having in its structure at one time both these layers but no mesoderm.

This leads us now to consider—

3. *The nature of extroversions of the bladder and allied conditions in the same region.*

Many explanations have been advanced as to bladder extroversions. I need only briefly discuss two before proceeding

to indicate the explanation afforded by what has already been stated. Champney's paper should be consulted for a full discussion of all the views.

Professor Wood, of King's College, London, held that the bladder was allantoic in origin. The allantois had its vascular layer (mesoderm) and mucous layer (endoderm). A varying amount of an "inflammatory change or adhesions, or some degenerative process . . . . such as syphilis," he believed, accounted for the varieties of this lesion. Wood's explanation was excellent, and the only one possible for the knowledge of the time then.

Another explanation is that of Durand, based on Tourneux's work. It is discussed by Ballantyne in his paper on "So-called Epispadias in Women," and seems to me inadequate. A similar theory is advanced by Shattock.

The best explanation of extroversion is afforded by the facts now known as to bladder development and the cloacal membrane. The bladder in the human female is not developed from allantois except at its apex, but is derived along with the urinogenital sinus from the anterior division of the entodermal cloaca. This cloaca has the cloacal membrane as its anterior boundary, and as this boundary has no mesoderm at one period, it may yield or cleave. This yielding, if complete, necessarily exposes all that is derived from the anterior primitive gut division—viz., bladder, urinogenital sinus, lower third of vagina, as in Champneys' case. Less degrees of fissure in linear extent or depth, give the other lesions. These are therefore explained, as Keibel has so well shown, by the actual development of the parts *plus* some bursting or dilating cause which, if it does occur (and of that we have as yet no proof), must do so at an early period of embryonic life.

We might also regard extroversion as a persistent blastopore, and for this view a good deal can be said both for and against.

My own special points have been (1) the identification of the posterior end of the cloacal membrane in the embryo with a point in front of the anus in the adult, and (2) the proof that in certain cases (Champneys' and Opitz') the lesion is formed prior to the complete formation of the vagina, and we thus see its component parts—viz., upper two-thirds Müllerian, and lower

third, urinogenital sinus with Wolffian ducts. In adult cases this differentiation is not seen, as the vagina is usually developed normally.

II. On Apparent Low Implantation of the Ureteric Opening.

A few remarkable cases have been recorded where incontinence of urine in the human female has been due to what seemed to be the lower ureteric opening ending not in the bladder but on the vestibule near the urethral or hymeneal edge, and on one side usually. The cause of this apparent low implantation has been disputed, the difficulty being to settle whether the part below the bladder is ureteric or part of a persistent Wolffian duct. I purpose in considering this question to summarise briefly some of the most recently-recorded cases, and to discuss the opposing views.

Baker, in 1878, narrated an interesting case where incontinence of urine was due to a minute opening two lines below and to the left of the lower angle of the meatus urinarius. When this was laid open, a tube, apparently the ureter, was found. This was dissected out from the anterior vaginal wall, cut off at a proper level, and successfully sutured into the bladder.

He also quotes similar cases in the practice of Dr J. B. S. Jackson of Boston, and of Dr Emmet of New York.

Dr Davenport of Boston recorded, in 1890, a case almost identical with the above; but in the vagina was noted a ridge on the anterior wall which could be traced from below and to the right of the cervix down to within an inch behind the meatus. At the edge of the urethral orifice, and below it, there was a heart-shaped papilla, with a small aperture from which urine issued.

The ridge above-mentioned was now cut across at its lower end, the tube dissected out and turned into the bladder, with ultimate success.

A very important case is that of Von Massari. The patient was a four-year-old girl, and had been operated on for atresia ani vaginalis. Afterwards incontinence of urine was complained of,

although it had of course previously existed, and no satisfactory explanation could be found for it. The child died from sepsis after a second operation for the preternatural anus, and on *sectio* an interesting condition was found. The kidneys were fused, and the left part markedly atrophied. The right ureter opened normally in the bladder, but the left passed at the neck of the bladder to the left side of the anterior vaginal wall and ended at the vestibule by a minute opening in a fold of the prepuce. The vagina was double, with a small communication between the two halves at the top, as one often finds.

Benckiser records two cases. In the first the lower ureteric opening was originally outside and below the urethral orifice. After two operations by ligature by Sänger, a fistula formed in the upper third of the vagina and to the right side. Implantation into the bladder was refused.

Benckiser's second case is interesting, as the lower opening of the ureter was immediately below the urethral orifice. This was sounded with difficulty, until by temporary closure of the orifice the tube became dilated. The ureteric sound could then be passed to the level of the *linea innominata*. The kidney was somewhat deep, and on cystoscopic examination two ureteric orifices were found in the bladder. Benckiser believes there was thus a third ureter, but this does not quite follow. On operation he removed the lowest part of the abnormal ureter, and thus turned the lower aperture of the remaining part into the bladder. Microscopically the portion removed was found to be ureter in structure.

I postpone consideration of Benckiser's explanations of his cases to a subsequent part of this paper.

The last paper is by Olshausen, who records two cases. In the first, a girl, ten years old, the abnormal opening was to the right of the hymen. The right ureteric opening was not present in the bladder. In the second case, a girl of fifteen, the lower opening lay to the right and a little below the urethral orifice. After several attempts the patient was cured by turning the ureter into the bladder.

The excised portions were found structurally to be ureter.

Benckiser states that Schwarz had collected 25 cases of

abnormal opening of the ureter, and 23 where the ureter ended blindly.

Olshausen draws attention to valuable papers by Tangl and Seycheron.

Tangl's case is interesting, as the left ureter and Wolffian duct ended blindly, close to one another, in the anterior vaginal wall. Seycheron's paper gives a very full resumé of cases of ureteric anomalies, and discusses the causes fully.

In the typical case of apparent abnormal low opening of the ureter, the orifice is near the urethral orifice or hymen edge: in one case (Von Massari) it was on the left edge of the prepuce. Usually the ureteric opening in the bladder is not found on the same side, but in one of Benckiser's cases both ureteric openings were found in the bladder.

Practically, the following explanations may be considered in cases where there is an apparent vestibular ureteric opening:—

(1). *The abnormal tube is due to the persistence and patency of the lower part of the Wolffian duct, and to the persistence of the original communication between it and the ureter.*

(2). *The abnormal tube is ureter entirely, with its lower end displaced down.*

Explanation (1) involves the persistence of the lower part of the Wolffian duct, and thus the question is raised as to the course of the lower part of this duct.

At the 6th to 7th week the Wolffian ducts open into the urinogenital sinus below the eminence of Muller—*i.e.*, below where the ducts of Muller end blindly (fig. 12), and after this the vagina develops more markedly. Nagel has stated strongly that the lower ends of the Wolffian ducts atrophy after this stage. His words are, "Mit dem Beginn dieser selbständigen Entwickelungsperiode der Scheide" (bei Embryonen von 2·5 cm. bis 3 cm. Rumpflänge) "veröden die Wolffschen Gänge und schwinden immer mehr" (S. 99 and 98).

Nagel is such an able and conscientious investigator that his statement has seemed to many to render the explanation we are considering untenable. I believe, however, that Nagel is wrong in his statement, and for the following reasons:—

I have been able to trace in the female fœtus at the three and a half months the Wolffian duct to the developing hymen,

and have shown that the lower ends of these ducts develop the hymen (fig. 21).

Thus these apparently abnormally low ureteric openings are really due to the persistence of the lower end of Gartner's canal and of its original communication with the ureter. The following is a brief recapitulation of the developmental stages concerned :—

The Wolffian duct in the 3·2 mm. fœtus opens into the anterior part of the undivided primitive gut. From the Wolffian duct the ureter buds off and grows up and back to develop the ureter and kidney, probably as far as the extremity of the straight tubules (fig. 5). If the Wolffian duct remains patent and persists in its lower part after developing the hymen at the third month, and if the ureteric communication with it continues, we thus get the apparent lower ureteric end at the outer edge of the urethral orifice—*e.g.*, at the hymeneal edge. The ureter may also open into the bladder, or it may not.

In Von Massari's case the course of the lower part of the alleged ureter is exactly that of a persistent Wolffian duct.

Amand Routh has come to the same opinion in regard to the Wolffian duct alone—viz., that it may persist "to the vestibulum vulvæ" (p. 167).

Explanation (2), that the whole tube, with its low aperture, is ureteric, is of course possible, but is unlikely. It would in such a case not be the usual malformation, a permanent temporary stage as in view (1), but an inexplicable abnormality.

The following is a resumé of the points bearing on view (1) :—

1. The Wolffian ducts persist normally in the lower third of the vagina at the third and a half month of fœtal life, and develop the hymen at their lower ends.

2. The Wolffian ducts between the epoöphoron (parovarium) and hymen usually atrophy in the adult.

3. The Wolffian duct may alone persist and end near the hymen (Amand Routh).

4. If it persist, have a patent lower opening, and the original communication between it and the ureter remain, we get the anomaly of apparent low implantation of the ureter explained.

DESCRIPTION OF PLATE XXXVII.

Fig. 37. Extroversio vesicæ: Champneys' case, reduced by ⅓ from drawing by G. T. Gwilliam (original drawing in St Bartholomew's Museum). N, navel; B, extroverted bladder; *Urt*, ureter, natural size; left shows amount of dilatability; V, two openings into vagina; F, blind fossa, entirely posterior to vagina; N′, left nympha; Z. labium majus; P, perineum; R, rectum prolapsed.

Fig. 38. Extroversio vesicæ in boy, case of Professor MacEwan, Dundee; the penis drawn down to show epispadias; B, extroversio vesicæ.

Fig. 39. Diagram of skiagram to show cleft pelvis of above case; dotted line shows soft parts.

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SEQUEIRA—"A Case of Ectopia Vesicæ with Patent Vitelline Duct," *Journ. of Anat. and Phys.*, 1896, p. 362. (This interesting malformation looks very like a unique one, where the ureter and part of the Wolffian duct opened on the right side into the urinogenital sinus. The communication is not actually made on the left side).

SEYCHERON—"Des abouchements anormaux de l'uretère dans le vagin et vulve," *Arch. de Tocol.*, 1889.

TANGL—"Beiträge zur Kenntniss der Bildungsfehler der Urogenitalorgane," *Virch. Arch.*, Bd. cxviii., p. 414 (1889). (Tangl draws attention to analogous cases in men where the ureter has opened into the vas deferens, seminal vesicles, or ejaculatory ducts).

The President said they were indebted to Dr Hart for his account of this extremely remarkable and comparatively rare case. Dr Hart had again brought forward evidence to confirm his own view of the development of the marks of the genital track.

Professor Simpson said he agreed with the President that the explanation that Dr Hart had given them sounded extremely reasonable, and his explanation would best enable them to understand the great many of the malformations that occurred. That was a condition he himself never had any experience of.

The President.—Are these all the cases on record?

Dr Berry Hart.—These are the main cases.

The President said it seemed on the theory Dr Berry Hart advanced that it was a thing that might happen very frequently.

Dr Berry Hart said that one might very easily lose a case.

Dr J. W. Ballantyne said it was now accepted as an understood thing in the explanation of the formation of malformations that the first thing to be looked for was permanence of a condition which usually disappeared. That was taken as the standard. If it failed to explain the malformation, then they had to look for something else. But a great many of the malformations of the single fœtus were thus explainable. There was a very common fallacy, viz., the idea of the different parts of the embryo moving about. Changes in the position of parts were entirely due to a difference in the rate of growth, contiguous parts growing at different rates, or one part atrophying and another growing. Of course the whole organism was growing at the same time. It was a sort of cinematographic procession. Dr Hart's explanation was the

most satisfactory, for it was along the lines of the most probable theory of the production of malformations and monstrosities.

Dr Milne Murray felt sure he was expressing the feeling of the Society when he thanked Dr Hart for the most interesting demonstration which he had just given of this difficult and obscure problem of development. He could not help feeling that there was a touch of sadness connected with such a demonstration as this, because it put an end to an old and familiar opinion, as to the development of the bladder from the allantois, which had held its ground for many years. But the facts which Dr Hart had brought forward left no ground for doubt as to the fallacy of the older view and the correctness of the new, and it seemed that to him (Dr Murray) that Dr Hart had made out, in a very clear way, an explanation of these remarkable anomalies of extroversion of the bladder and allied condition. No doubt this hypothesis demanded verification by future investigation of actual cases, but the demonstration Dr Hart had given went a long way to place the matter on a sound basis.

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LAWS

OF THE

Edinburgh Obstetrical Society

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LAWS

OF THE

EDINBURGH OBSTETRICAL SOCIETY

INSTITUTED IN 1840.

I. The object of the Edinburgh Obstetrical Society is to advance the knowledge of Obstetrics, Gynecology, and the Diseases of Children, by holding Meetings for the purpose of receiving Communications on, and for the discussion of, subjects connected with these branches of Medical Science. It is expected, therefore, that the Fellows will communicate any interesting cases, and exhibit to the Society any important morbid specimens in these departments which may come under their notice. The proceedings of the Society shall be strictly confidential.

II. The Society shall be composed of Honorary, Corresponding, and Ordinary Fellows, who must be duly registered Practitioners. Ordinary Fellows not resident in Edinburgh may be enrolled among the Corresponding Fellows (under the provisions of Law XVI).

III. The Society shall be managed by a Council, consisting of the President, two Vice-Presidents, Treasurer, Librarian, two Secretaries, an Editor of Transactions, and eight Ordinary Fellows.

IV. The Society shall meet monthly or bi-monthly during the Session, the time of meeting being Eight P.M.; but Extraordinary Meetings may be called by the Council.

V. Practitioners and Students of Medicine may be admitted, on the introduction of a Fellow, during Public Business, to any Meeting of the Society.

VI. The Election of Office-Bearers shall take place at the first Meeting of each Session. Their term of office shall be for two years; and, with the exception of the Treasurer, Librarian, Secretaries, and Editor of Transactions, they shall not be eligible for re-election for two years for the particular office they have held. The Senior Vice-President and the four Councillors highest on the list shall retire annually. The elections shall be conducted by voting papers. Previous to the election the Council shall draw up a list of the Fellows whom they suggest to the Society for election as Office-Bearers. This list shall be printed on a separate paper and issued with the billet of the Election Meeting. Fellows are not necessarily expected to adhere to the names on the paper, but may substitute and propose any others they think fit.

VII. The Council shall regulate the business of the Society, and shall prepare, with the consent of the authors, such abstracts of the proceedings of the Society as it may be desirable to publish. It shall also draw up a series of questions, one of which shall be announced for discussion in the billets of any evening when there is a deficiency of Communications.

VIII. Each writer of a paper must supply to the senior Secretary a short abstract of his paper at least ten days before the meeting at which it is to be read, so that it may be printed and issued with the billet for that meeting.

The right of publishing any paper read before the

Society remains in the hands of the Society, and MSS. of all Communications which have been made to the Society shall be at once handed to the Editor of the Transactions for publication in the Transactions, in whole or in part, as the Council may determine. Authors may, however, allow their papers to appear elsewhere, provided that the publication of the Transactions is not thereby delayed.

IX. When any Communication has been twice entered in the billet without having been read, or a sufficient apology sent in, the Secretary shall refuse admission of the same to the billet for at least two months.

X. The President shall keep order in the Meetings, and shall have a deliberative as well as a casting vote. He shall always be addressed at the Meetings by the speaker.

XI. The Secretaries shall keep a regular record of what takes place at the Meetings, and shall draw up a minute of the proceedings, which shall be submitted for approval at the subsequent Meeting.

XII. The Treasurer shall be accountable for all the moneys of the Society, and shall submit a statement of his accounts at the first Meeting of each Session. These accounts shall be audited by two Fellows to be nominated by the President.

XIII. When any one is proposed for the Fellowship, the proposer or seconder shall state in writing the professional qualifications possessed by the Candidate.

XIV. The names of all applicants for the Fellowship, along with those of their proposers and seconders, must be entered on the billet calling the Meeting at which they are to be balloted for. A majority of two-thirds of the Fellows present shall be required for the admission of Candidates.

XV. The Honorary Fellows shall be limited to forty, of whom not more than twelve shall be British. The Council may submit annually in July a list of names necessary to complete the number of Honorary Fellows.

XVI. No one shall be elected a Corresponding Fellow until he shall have communicated a paper to the Society, and shall have been recommended by the Council.

XVII. No one shall be admitted to the privileges of an Ordinary Fellow until he has paid the Entrance Fee and first Annual Contribution.

XVIII. If any Ordinary Fellow delay to pay the Entrance Fee beyond three months, he shall forfeit his Fellowship, unless he shall assign a sufficient reason for his neglect. Fellows who are three years in arrear are liable to have their names deleted from the roll of the Society.

XIX. For Ordinary Fellows the Entrance Fee shall be One Guinea, with a Contribution of Five Shillings, payable on admission, and thereafter annually at the first Meeting in November. Fellows are allowed to compound for their Annual Contributions by a single payment of Five Guineas.

XX. Any Corresponding Fellow, at his own request, may be admitted to all the privileges of an Ordinary Fellow, on paying the usual Entrance Fee and Annual Contribution.

XXI. If any Ordinary Fellow, after having been duly admitted and having paid his Entrance Money, wishes to resign his Fellowship, he must duly intimate the same to the Secretary; and the Society will consider no resignation as having taken place until it has been so notified; nor will they accept any resignation, nor transfer any Ordinary Fellow to the list of Corresponding Fellows, until the Fellow has discharged all his obligations to the Society.

XXII. All Motions shall be decided by a simple majority of votes, except proposals for altering the Laws, which shall require a concurrence of two-thirds of the Meeting.

XXIII. All Motions shall be made in writing at one Meeting, printed in the billets, and considered at the following Meeting, except in cases which do not admit of delay. Any such urgent Motions cannot be passed except by two-thirds of the Meeting voting in their favour.

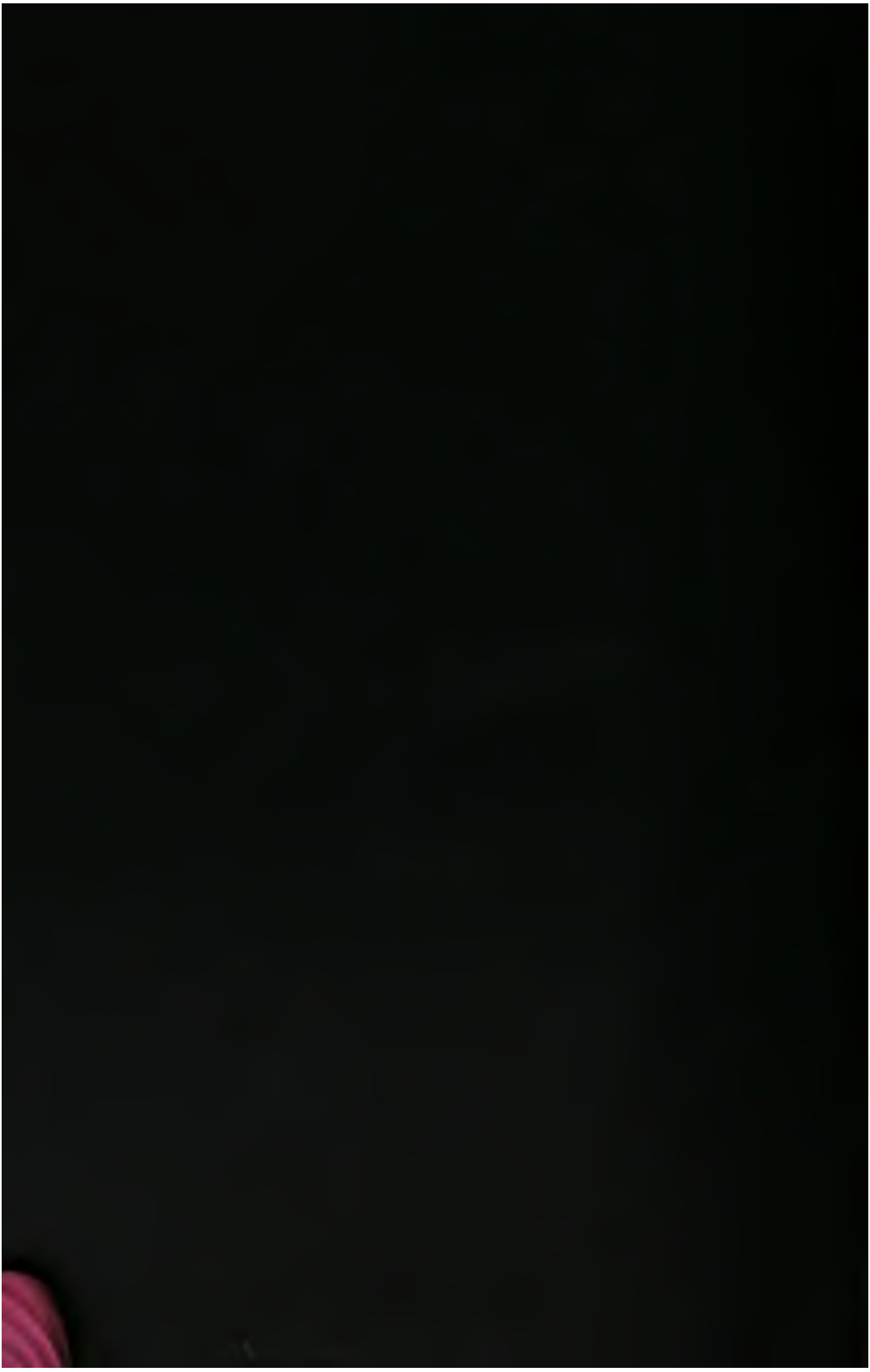
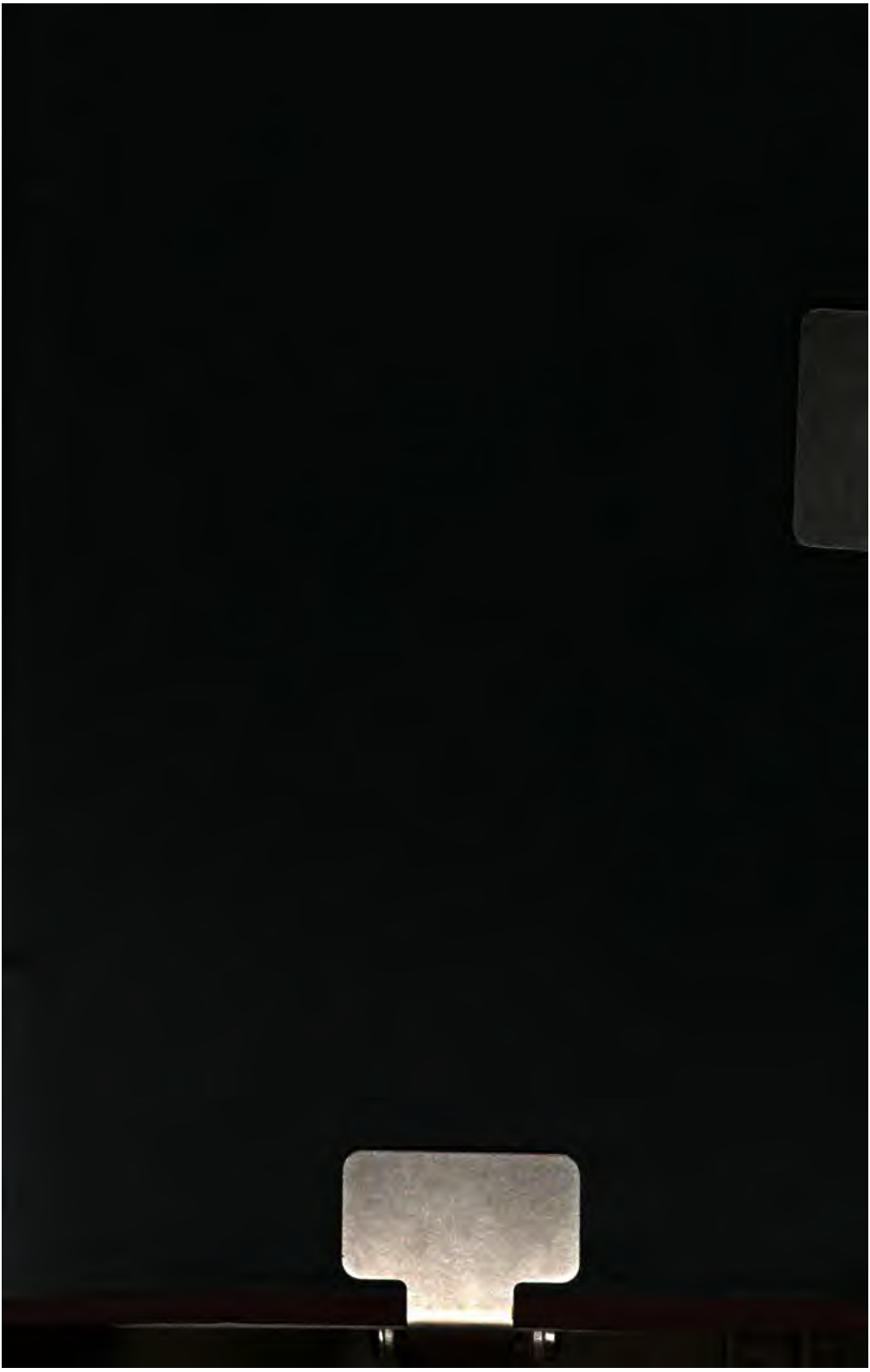
BYE-LAWS

I. The names of all Fellows of the Edinburgh Obstetrical Society shall be printed in the Transactions.

II. The Council shall revise the Transactions and have the power of determining what shall appear in them.

III. Honorary Fellows, and Ordinary Fellows not in arrear with their Annual Contribution, shall receive the volume of the Transactions when it is published after the close of the Session.

IV. A Special Committee for the Examination of Specimens may be appointed at any meeting of the Society, said Committee to consist of the owner of the Specimen and two other Fellows appointed by the Society.

V. Specimens shown at the Meetings may become the subjects of discussion, the time allotted to each specimen to be at the discretion of the President, and the whole duration of the discussion on specimens not to exceed half-an-hour.

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